

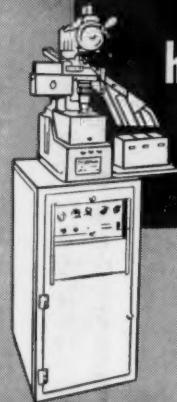
METAL SHOW
ISSUE

MODERN Machine Shop

NOVEMBER, 1954


 ACCO products

A FULL LINE
to meet every
hardness testing
requirement



FOLY AUTOMATIC



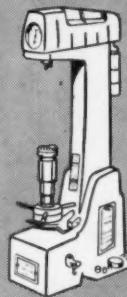
SUPERFICIAL



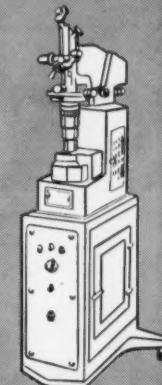
REGULAR



SEMI-AUTOMATIC



SPECIAL

TUKON
MICRO & MACRO

• Hardness testing standards of the metal industry have been set and maintained by WILSON "ROCKWELL" Hardness Testers since 1921. In steel mills, non-ferrous mills and metal fabricating plants everywhere, WILSON "ROCKWELL" standards have been the mark

of perfection for a generation.

What is your testing problem? Whether your material is hardened steel, sheet metal, small parts, tools, rounds, tubes, soft metals or plastic materials—all are tested quickly and accurately by one of the many WILSON models.

Let a WILSON expert discuss your hardness testing problem. There is no obligation.

*Trade Mark Registered

BOOTH 1228

National Metal Exposition
International Amphitheater
Chicago • November 1-5, 1954

ACCO



TRADE
MARK

Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE

230-G Park Avenue, New York 17, N. Y.

PAUL BRALES
and
TUKON



DOWN LIKE A FEATHER!

... a little safer, a little smoother
because this part was BORIZED*

You're heading for the runway on final approach — fifty tons of airliner hurtling through space at over 100 miles an hour, yet settling to the earth as lightly as a feather. This is the time when a lot of things must work *just right*.

That they do so, thousands of times a day at airports the world over is a real tribute to the aviation industry. Such performance is made possible only through the utmost precision in every step of manufacture. That's why so many parts of the modern aircraft are borized. Here, for example, is a torque arm for a landing gear, borized on a Heald Model 422 Bore-Matic.

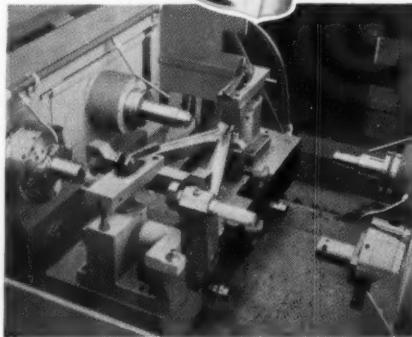
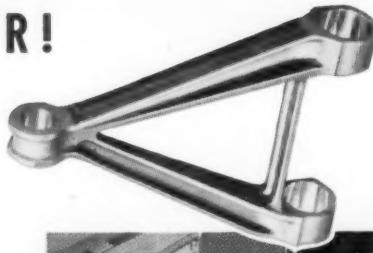
Whenever a part is borized, you can be sure of three things. A finer, longer-lasting, precision made part. Important savings in time and production cost. A definite competitive advantage for your product. That's why **IT PAYS TO COME TO HEALD**.

* *Precision finished by a
Heald-engineered method
on a Heald Bore-Matic.*

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York



This Model 422, is used to bore, counter-bore and chamfer seven different torque arms for landing gear components. Aligning rails on both the boringhead bridges and the fixture sub-base aid in accommodating the various parts.

Basic fixture equipment consists of angle plate type with swinging gate locator and hand cam clamps — gate locator is interlocked so that machine will not operate unless part is correctly located.

publisher
M. L. Forney
 general manager
Richard S. Kline
 editor
Fred W. Vogel
 editor emeritus
Howard Campbell
 managing editor
Robert I. Shore
 new equipment editor
R. L. Griesinger
 contributing editor
Gilbert C. Close

MODERN Machine Shop

contents

VOLUME 27

NUMBER 6

NOVEMBER, 1954

Over the Editor's Desk	112		
Features in This Issue	115		
Production by Resistance Upset	116		
By Gilbert C. Close			
Multiplying Your Efforts	128		
By Alfred M. Cooper			
How to Machine Magnetic Ingot Iron	136		
By W. E. McFee			
36th National Metal Congress and Exposition	146		
Program of ASM Technical Papers	150		
Program of AWS Technical Papers	166		
Program of AIME Institute of Metals Division	180		
Program of SNT Technical Papers	192		
List of Exhibitors	200		
On Exhibit at the Metal Show	222		
Modern Equipment at Work			
Mar-Free Bends Produced in Precoated Lock-Seam Tubing	254		
Special Tooling Arrangement Permits Deep Contour Cuts in a Single Lathe Pass	256		
Special Chucking Fixture Increases Production of Hobbed Pinions	258		
3-D Magnifier Used in Inspecting Precision Aircraft Parts	262		
Drawing Seamless Tubs for the Navy	264		
Automatic Broaching of Electric Motor Stators	266		
Tool Change Results in Connecting Rod Production Increase	270		
Departments			
News of the Industry	272	Services Directory	424
New Shop Equipment	292	Editorial	426
"Where to Get It"	416	Index to Advertisements	428
Advertising Representatives			
221			

Published monthly and
copyrighted (1954) by

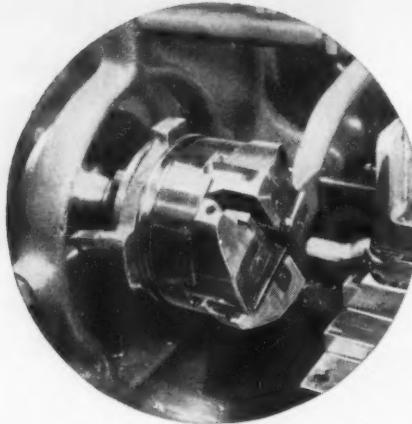
Gardner Publications, Inc.
431 Main St., Cincinnati 2, Ohio

Printed in U. S. A.

Acceptance under
Section 34.64, P. L. & R.
Authorized

Member





Faster Turning Using 4 Cutting Tools *Simultaneously*

By turning, facing, and chamfering on Landis Threading Machines, automotive parts production at Thompson Products in Detroit has been substantially increased. This LANDIS Hollow Milling technique makes large out-put increases possible by applying a number of simultaneously-functioning cutters, thus multiplying the feed rate of a single tool.

The illustration shows one of these parts, steering links, being turned and faced on a LANDMACO Double-Spindle Lead-screw Threading Machine. SAE 1040 steel forgings are turned (1/32" stock removal) $1\frac{1}{8}$ " in length and faced by four special turning cutters in $\frac{7}{8}$ " V LANCO Hardened and Ground Heads. Production regularly averages 200 pieces per hour, with the $\frac{5}{8}$ " turned diameter held within

$\pm .004"$. Four hours' production is obtained between cutter grinds.

This LANDIS technique offers important advantages over other methods of turning, forming, and facing. The use of four or six simultaneously-functioning cutters, in addition to increasing production, reduces tool cost and workpiece spoilage to the minimum. The diametrically-opposing cutters evenly distribute cutting strains and maintain proper work alignment. LANDIS Cutters, available in a wide variety of styles, are economical for they are usable for most of their length with only a simple regrinding of the rake angle.

Additional information will be sent on request—please include specifications when writing.

LANDIS Machine COMPANY

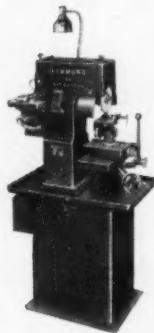
394 WAYNESBORO • PENNSYLVANIA • U. S. A.

A SHARP POINT

EVERYTIME!



Hammond OF KALAMAZOO CARBIDE TOOL GRINDERS



Ask any user of the MORE THAN 6,000 HAMMOND CARBIDE TOOL GRINDERS now in service — "point by point" all the way through — these machines are precision built for efficient trouble-free grinding of CARBIDE AND HIGH SPEED STEEL TOOLS.

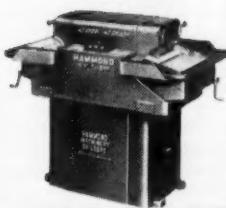
There's no substitute for experience, and Hammond has been building dependable machinery for more than 70 years!

Write for Catalog

Model CB-77 Chip Breaker and Diamond Finishing Grinder for handling box and single point tools. (Model CB-77W for wet grinding also available).



Model WD-10 Wet or Dri 10" Carbide Tool Grinder with double cup wheel construction. (Available with straight and cup wheel also).



Model 14-WD Wet or Dri 14" Carbide Tool Grinder. Designed for production grinding of medium and large size tools. Will quickly pay for itself in longer tool life, wheel economy, and faster grinding.

"Good Machinery Since '82"

Hammond Machinery Builders
INC.

1615 DOUGLAS AVENUE • KALAMAZOO, MICHIGAN

SPECIAL INTRODUCTORY UNIT

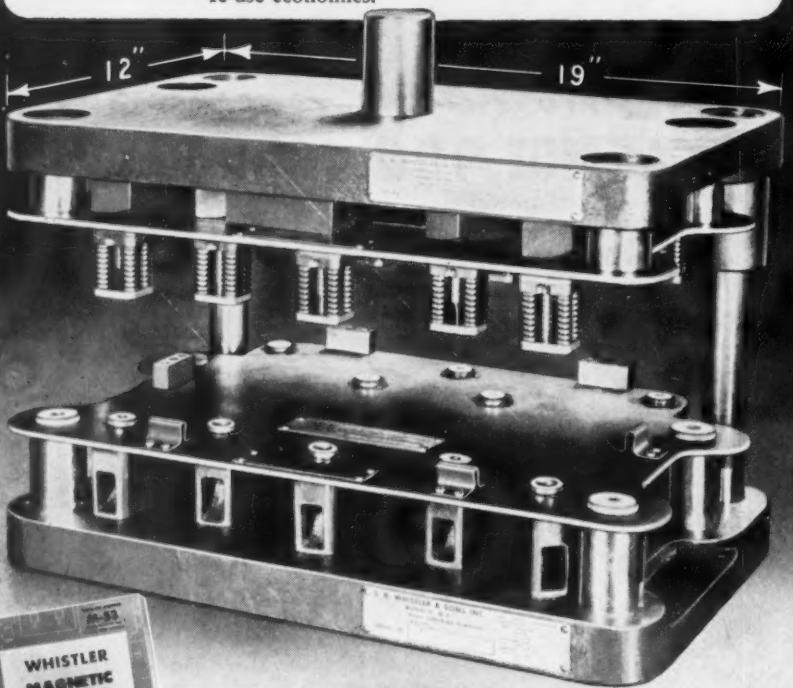
WHISTLER 10 HOLE MAGNETIC PERFORATING DIE

**Cut die costs
drastically,
start
production
quicker**

This M-12-14 Complete Introductory Unit includes a set of blank templates, ten punches, dies, strippers and punch and die retainers complete to make up a 10 hole precision perforating die. Any diameters from $\frac{1}{8}$ " to $\frac{1}{2}$ " to your selection. Catalog illustrates additional re-use economies.

\$675

NET F.O.B. OUR
PLANT



SEND FOR CATALOG Illustration shows how quick and simple it is to set up a Whistler Magnetic Perforating Die ready for production. Larger standard units can be added to suit your requirements.

S. B. WHISTLER & SONS, INC.

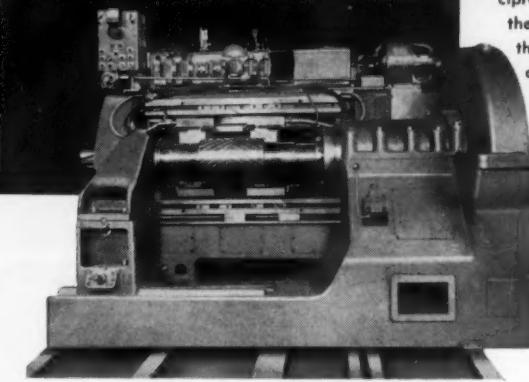
*Manufacturers of Adjustable, Magnetic and Custom
Built Dies for All Industry*

WHISTLER DIES ARE
CUTTING COSTS FROM
COAST TO COAST

740 Military Road
DEMONSTRATIONS DAILY—BOOTH 135—METAL SHOW—NOV. 1 TO 5

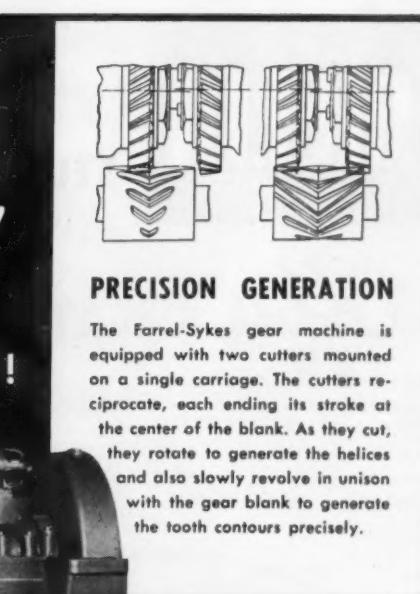
Buffalo 23, New York

HOW TO "PRECISION GENERATE" GREATER PROFITS!



The speed, in operation and set-up, of a Farrel-Sykes "Twin-Head" gear generator, will cut your man and machine hours, and therefore decrease your manufacturing costs. New design features contribute to more efficient operation. Rapid selection of speeds and feeds, easy adjustment of cutters, easy and positive control of infeed, are examples.

And the accuracy inherent in the Farrel-Sykes process of gear gener-



PRECISION GENERATION

The Farrel-Sykes gear machine is equipped with two cutters mounted on a single carriage. The cutters reciprocate, each ending its stroke at the center of the blank. As they cut, they rotate to generate the helices and also slowly revolve in unison with the gear blank to generate the tooth contours precisely.

ation assures accurate tooth spacing, profile and helix angle. The gears you make will operate smoothly, quietly and efficiently for many years to come.

The "Twin-Head" generator cuts all types of herringbone gears, single helical and spur gears, two members of a cluster gear simultaneously, and other toothed and cylindrical forms.

Ask for bulletin T-455.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, New York, Cambridge (Mass.), Akron, Cleveland, Chicago, Los Angeles, Houston

FB-968

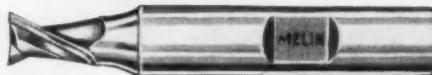
MELIN

STUB LENGTH END MILLS

with flutes shorter than regular

Offer GREATER STRENGTH...

TWO, THREE AND FOUR FLUTE



...★ *Plus an Exclusive* ... In addition to manufacturing a complete line of End Mills, the Melin Tool Company makes several standard Stub Length Mills exclusive of other tool manufacturers.

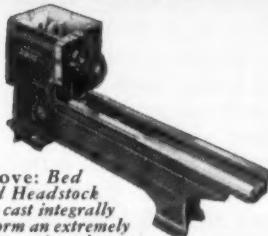
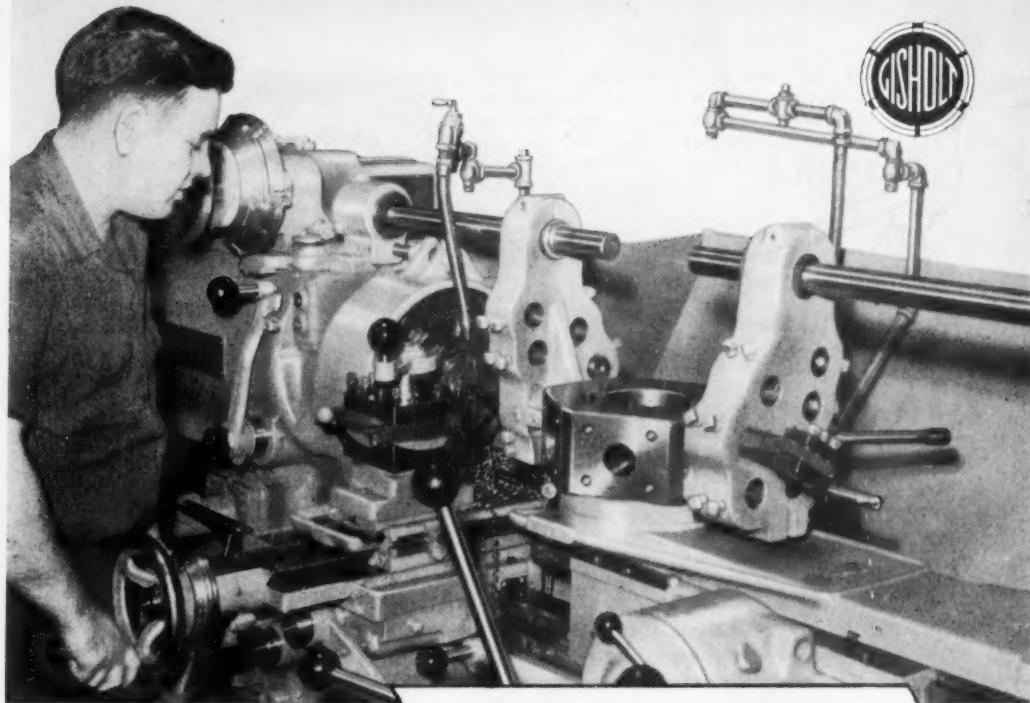
The new Melin Tool Catalog No. 54-C lists the specifications on these *all inclusive* Stub Length Tools ... and ... they offer greater strength and less breakage. Write for your catalog ... today.

Representatives in Principal Cities

**MELIN TOOL
COMPANY, INC.**

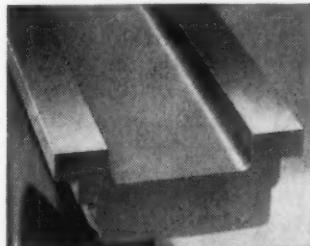
3373 West 140th Street
Cleveland 11, Ohio





Above: Bed and Headstock are cast integrally to form an extremely heavy unit and to provide the rigid foundation for all types of work.

Below: Block type ways are straddle keyed to the bed and ground in perfect alignment with the spindle. All working surfaces are hardened to 64-66 Rockwell "C".



ACCURACY that doesn't "wear off"

Here are two good reasons why you can count on the accuracy of Gisholt Turret Lathes—now and years from now.

One-piece bed and headstock, cast as a heavy, rigid unit, reduce distortion and vibration to a minimum. Headstock is jig-bored to insure—and maintain—perfect alignment of spindle and drive shafts, with ample metal to provide the most solid support possible.

Hardened steel ways are augmented by hardened steel strips secured to the ram saddle, as well as hardened steel gibs and clamps, making an assembly that is virtually wear-proof. Its accuracy is further preserved by force lubrication.

These advantages are yours for the long life of any Gisholt Turret Lathe. Ask for complete details.

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT

MACHINE COMPANY

Madison 10, Wisconsin





AUTOMATIC GRINDING WHEEL BALANCING Now on Cincinnati

This exclusive Cincinnati feature automatically balances the grinding wheel in a few seconds with the spindle rotating at its operating speed.

Eliminates vibration and resultant chatter . . . permits more effective stock removal; produces superior finish; reduces wheel cost per workpiece.

Automatic balancing of grinding wheels climaxes years of Cincinnati research in adapting a fundamental principle of balancing to the needs of precision grinding machines. ¶ Under ordinary shop conditions, using conventional static balancing equipment, even skilled operators will seldom balance the grinding wheels so that

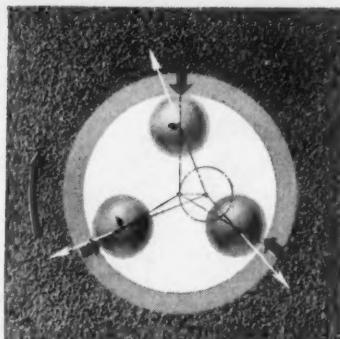
a precision balance is obtained. At normal operating speeds the slightest degree of unbalance produces an uneven cutting action. Although not always visible to the eye, this results in a variation of sparking. Cincinnati automatic balancing system is ten times as accurate as conventional static balancing. ¶ Together with trouble-free FILMATIC spindle bearings, automatic balancing of grinding wheels assures smooth, even cutting to closer dimensional accuracy, superior finishes and higher production at a lower cost. ¶ Complete information may be obtained by writing for publication No. G-637-1.

**CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO**



CENTERTYPE GRINDING MACHINES
CENTERLESS LAPING MACHINES •

CINCINNATI



Here's how it works. Three steel balls are carried in a raceway in the wheel end of the spindle. As the spindle rotates, the balls are free to move and correct any unbalanced condition that may exist. Then they are clamped in position.

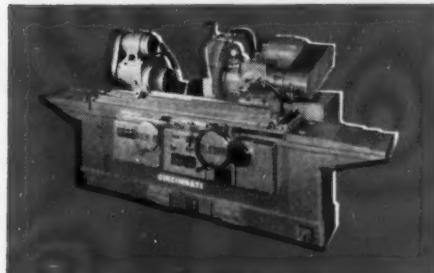


Standard Equipment

Filmatic

6", 10" L,
10" and 14" L
PLAIN
HYDRAULIC GRINDERS

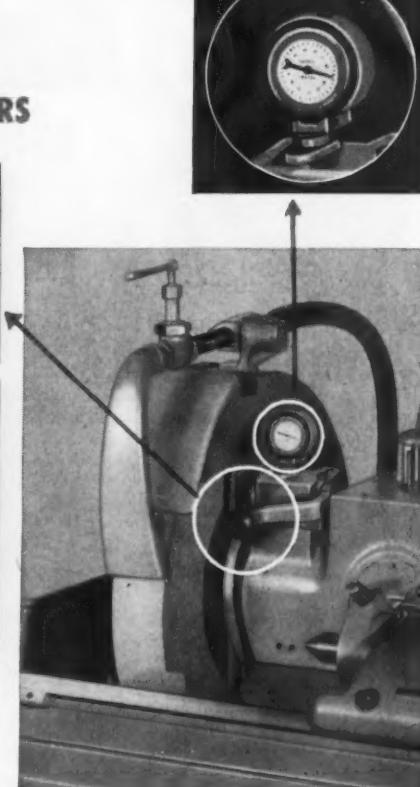
This lever clamps and unclamps the balls in their raceway. Anyone can perfectly balance the grinding wheel... in a few seconds' time.



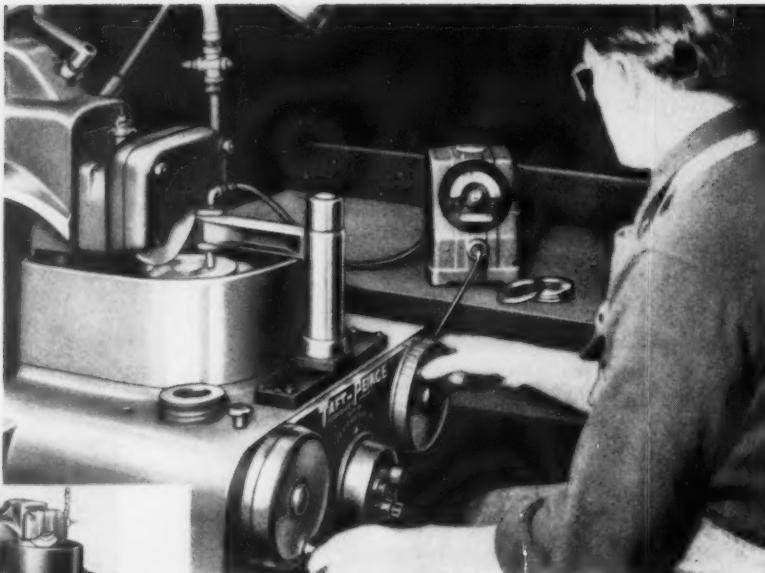
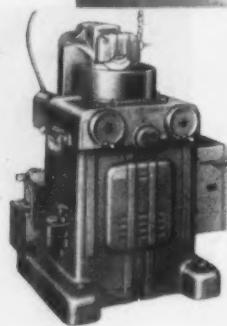
CINCINNATI FILMATIC 10" x 36" Plain Hydraulic Grinding Machine.

- CENTERLESS GRINDING MACHINES
MICRO-CENTRIC GRINDING MACHINES

An indicator needle tells the operator when the system is balanced.



Grinding slitting knives to within .0001". Air gage permits on-the-job size control.



THIS 6" ROTARY GRINDER Grinds To .0001"

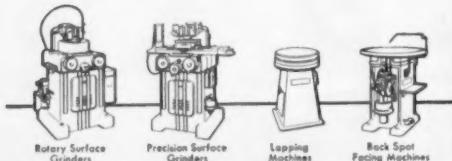
**Taft-Peirce Designed It To Speed
and Simplify Precision Grinding**

Hard to believe but true — this Taft-Peirce 6" Rotary Surface Grinder makes grinding to .0001" an amazingly simple job. Exceptionally accurate, sturdy, vibrationless. An exclusive vernier feed permits precise vertical settings of .0001" instantly . . . exactly. Takes the guesswork out of finish grinding. Gives you flatter, finer surfaces.

And here are two more important features. A simple adjustment tilts the wheelhead up to 30

degrees in the vertical plane. The work spindle and superpower magnetic chuck tilt 7½ degrees forward or backward. This chuck holds even very small workpieces firmly and dependably in the center of the faceplate.

Operators report undiminished accuracy over unusually long periods, sharply reduced wheel-wear, and negligible maintenance. Ask for the Taft-Peirce 6" Rotary Grinder Bulletin for more information.



THE TAFT-PEIRCE MANUFACTURING COMPANY, WOONSOCKET, RHODE ISLAND

Speed Up Your Rotary Milling Jobs!

KNIGHT'S
Power Feed

ROTARY TABLES

... For use on
any vertical
milling or
boring machine



Complete self-contained motor driven units that adapt any vertical milling or boring machine for cycle milling and indexing . . . cam milling . . . production milling . . . continuous face milling . . . other jobs that require an automatic revolving fixture.

No setup time required—special equipment or adaptors unnecessary—no feed connection to machine. Plug them in to electric outlet and they're ready for work. An exceptional time and labor saver!

Mail Coupon For Brochure

W. B. KNIGHT MACHINERY CO.
3922 West Pine Blvd. • St. Louis 8, Mo.

November, 1954

20" MODEL—18 quick-feed changes, $1\frac{1}{2}$ " to 52", or 3" to 108"

42" MODEL—Infinite variable feed. Automatic positioning. Table can be increased to 60" with sub-plates.



ATTACH TO COMPANY LETTERHEAD

W. B. KNIGHT MACHINERY CO.
3922 West Pine Blvd. • St. Louis 8, Mo.

Send information on Power Feed Rotary Tables.

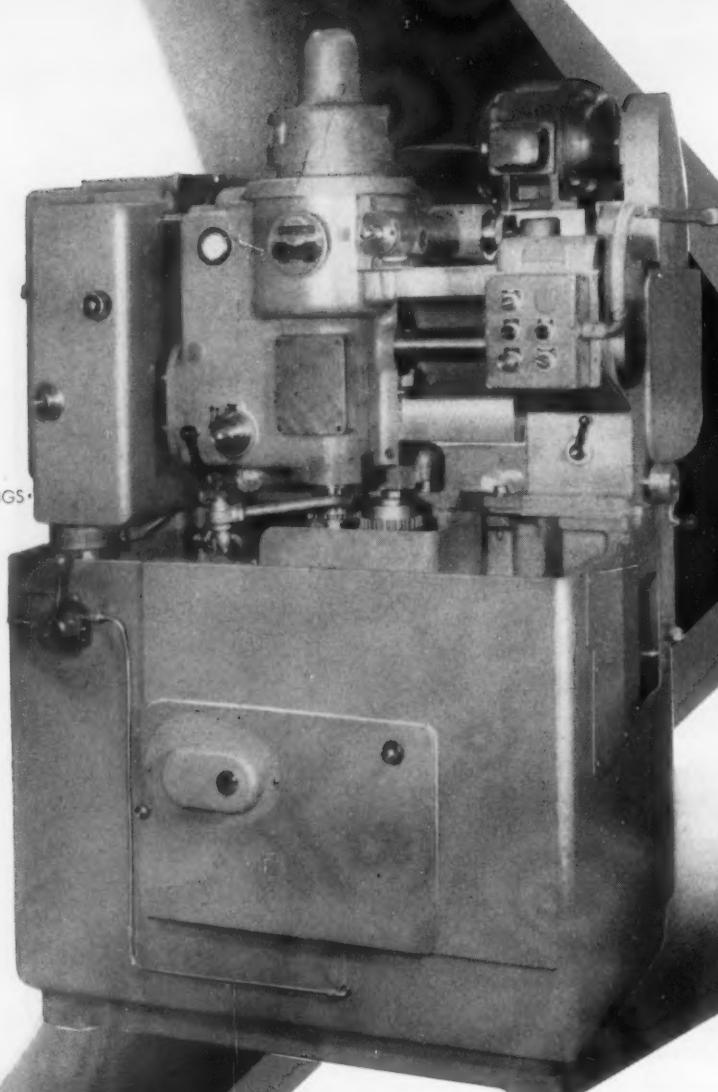
Name.....

Title.....

Also send details on Knight Milling Machines.

GS•4GS•4GS•

•4GS•8•



N.

THE *Fellows*

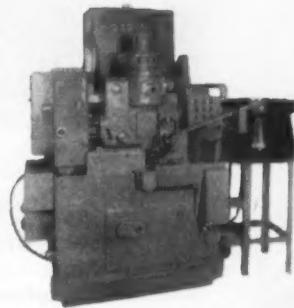
NEWS

FOR GEAR PRODUCTION MEN

4GS • 4GS • 4GS

- This, the all-new No. 4GS Gear Shaper, will (1) remove more stock, (2) hold to limits more easily, and (3) turn out finish-cut or preshave gears faster than anything you've known.
- It's a production man's Gear Shaper—with a drive-mechanism beefed up to match its 3 $\frac{3}{8}$ inch diameter cutter spindle which takes 4 inch cutters. Speeds from 98 to 635 strokes per minute are available through pick-off gears.
- Range of rotary feeds from 0.008" to 0.024" per stroke based on a 4 inch pitch diameter cutter.
- Its maximum capacity of 6 inches p.d. x 2 inch face puts it in line for the greatest percentage of mass output gear cutting ... Ask any Fellows office for advance engineering information.

4GS • 4GS



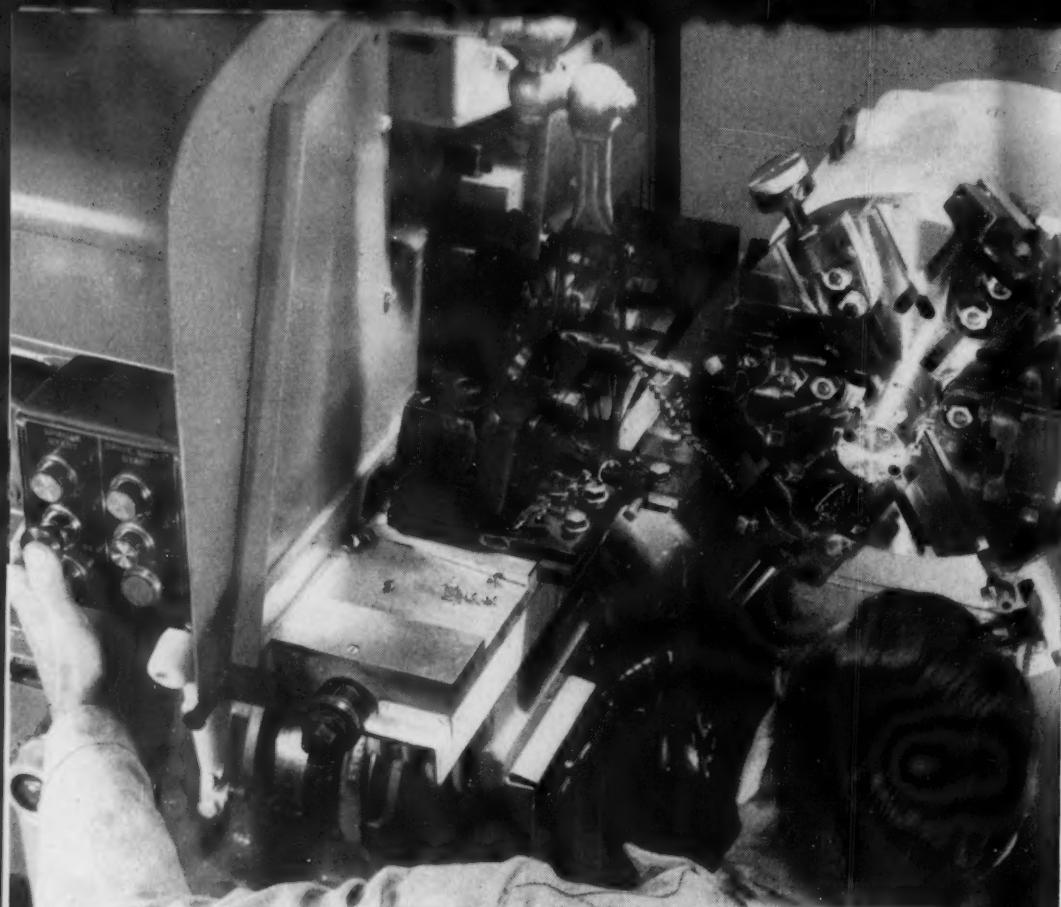
Ideally adapted to automatic loading as illustrated here

GEAR SHAPER COMPANY

Head Office and Export Department: 78 River Street, Springfield, Vermont.

Branch Offices: 319 Fisher Building, Detroit 2 • 5835 West North Avenue, Chicago 39

2206 Empire State Building, New York 1 • 5 Martel Bldg., 6214 West Manchester Ave., Los Angeles 45, Calif.



Speedier Set-ups and Output of Medium-sized Screw Machine Work . . .

The No. 4 Automatic, like all Brown & Sharpe Automatic Screw Machines, incorporates the most advanced features for high-speed, repetitive production to extremely close tolerances. In addition, it has many outstanding set-up advantages: turret tools, for example, are readily accessible and the method of mounting them provides firm support for heavy cuts. Moreover, a separate motor permits tools to be "jogged" into position — or a complete cycle of operation can be run through by hand. Investigate all the advantages of the No. 4. You'll agree it's the production leader in its class — an important contribution to metal-working. Write for Bulletin. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

Brown & Sharpe 

Tapping Expensive Parts?



Specify

**BESLY
TAPS**

**for Greater Accuracy
and Dependability**

One poorly tapped hole and this partially completed crankshaft becomes scrap! Quality taps have more than proven their worth on expensive parts like this crankshaft for one manufacturer of diesel engines. That's why Besly Taps are specified and used throughout the entire plant—to bring accuracy, dependability and *lowest tapping costs* to all kinds of tapping jobs. Besly Taps can give you better threads, higher production and longer tap life for

lowest tapping costs in your plant, too. **BUT YOU DON'T HAVE TO TAKE OUR WORD FOR IT—WE'LL PROVE IT!** Let an experienced Besly Tap Engineer recommend a Besly Tap for your toughest job. This free trial demonstration will show you what Besly quality really means—and what it can mean on every tapping job in your plant. Ask your Besly distributor for this free trial demonstration or write directly to us.

Free-TAP TIPS



Get this handy HANDBOOK FOR TAP USERS. It's filled with up-to-date facts on tapping methods and tap selection. Write for your free copy now.

BESLY-WELLES

CORPORATION

Established as Charles H. Besly
& Co. in 1875

108 Dearborn Avenue
BELOIT • WISCONSIN

LeBlond sliding

16"/32"

16"/32"

32"/50"

bed gap lathes

4 Sizes, 16"/32", 25"/50", 32"/60" Heavy Duty & 17"/28" Regal

*The most versatile lathes in the world
give you:*

— **Variable gaps for work
with large projections**

Occasional work with large or irregular projections doesn't warrant buying a large-swing lathe. And extra-long pieces that have to be turned now and then don't justify the cost of a long-bed machine. That's why tool rooms, maintenance departments and contract shops depend on LeBlond Sliding Bed Gap Lathes for both out-sized jobs and everyday engine lathe work.

Here's how they work. LeBlond Sliding Bed Gap Lathes are built with two bed sections. The top bed is movable on the lower. With the top bed extended, a wide gap is created providing nearly twice the swing of a conventional engine lathe. Center distance can also be increased greatly allowing long lengths to be turned. With the gap closed this triple-duty lathe does all the work of a heavy-duty engine lathe of comparable size.

LeBlond Sliding Bed Gap Lathes come in four sizes. Three heavy-duties, the 16"/32", 25"/50" and 32"/60"; and a low-cost 17"/28" Regal. These lathes will give you swings up to 61½" and up to 13' distance between centers (base).

And, of course, you get all the well-known LeBlond features. Hardened and ground steel bed ways; low-friction, high-power Spur Gear headstock; totally enclosed quick-change box; automatic lubrication; one-piece apron; thrust-lock tailstock, and many more.

Where utmost versatility is what you need in a lathe, you can't do better than a LeBlond Sliding Bed Gap. Whatever your turning needs may be, one of LeBlond's 76 models is bound to suit. Contact your nearby LeBlond Distributor or write Cincinnati today.

— **Adjustable center distance
for extra-long work**

*For complete description
and specifications of the
16"/32", 25"/50" and 32"/60"
heavy duties
ask for Bulletin SBG-103 E.
17"/28" Regal, Bulletin RSBG1 E.*

— **Capacity for all regular
engine lathe work**

.... turned faster by

LeBLOND
of Cincinnati

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 67 YEARS.

BRYANT No. 21 THREAD GAGE



You can inspect both internal and external threads rapidly and accurately on the Bryant No. 21 Thread Gage. Internal threads from $\frac{1}{16}$ " to 5" diameter and external threads from #8 to 5" diameter can be checked — eight to ten times faster than with conventional gaging methods. An attachment for checking squareness-of-face in relation to the axis of a thread is available. Write for descriptive literature on this and other Bryant Gages.

Bryant Chucking Grinder Co., Springfield, Vermont, U.S.A.

When "Almost as Good . . ." ISN'T GOOD ENOUGH

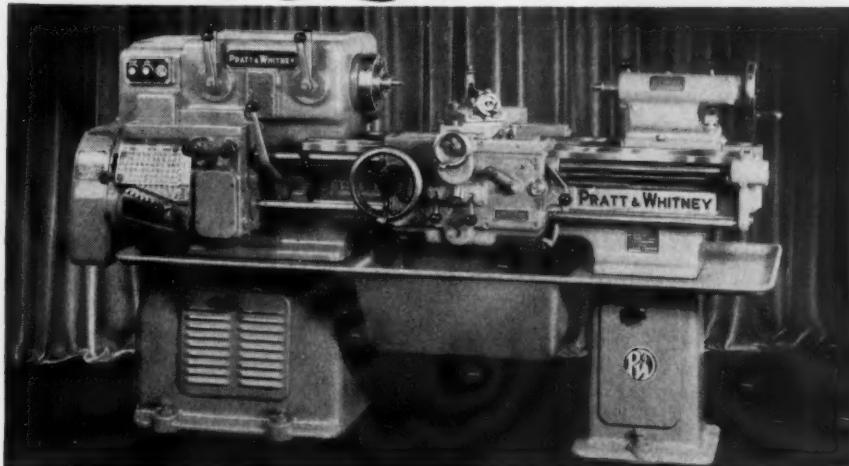
You turn to

PRATT & WHITNEY

MODEL "C"

Lathes

12" and 16" SIZES
in standard bed lengths



For Precision to meet TODAY'S demands

Today, countless manufacturers must maintain daily standards of tool room accuracy unheard of only a few years ago. If this is your problem, you can't afford "almost as good" equipment. It's time to invest in a P&W Model "C" Lathe. Finest example of all that Pratt & Whitney stands for, the Model "C" incorporates every detail of advanced design, honest material and conscientious workmanship that help make this the finest lathe available anywhere at any price.

PRATT & WHITNEY

DIVISION NILES-BEMENT-POND CO.

25 Charter Oak Blvd., West Hartford 1, Conn., U.S.A.

Please send my copy of Model "C" Lathe Circular No. 539.

NAME _____

POSITION _____

COMPANY _____

CO. ADDRESS _____

CITY _____ ZONE _____ STATE _____

FOR COMPLETE INFORMATION

... use this coupon to send for your copy of Circular 539 that fully describes all of the advanced features of the Model "C" Lathe. See for yourself how it will help you establish and maintain new standards of accuracy in your tool room.



Production time
is lost waiting
for wiping
materials



...Another good reason for switching to Scott Wipers!

Instead of having to leave the job to get clean wiping material, workers keep a box of Scott Wipers next to them all day long. This simplified system of distribution and control saves valuable production hours.

Scott Wipers are sanitary, disposable. They end

the laundering problem . . . and they greatly reduce the costly scratches and digs in finished work caused by chips lodged in wiping materials.

Whatever you're using now—compare them with Scott Wipers for cost, convenience, performance.

Your Scott representative or distributor will help you set up a production-line demonstration. Call him or mail the coupon today.



Scott Paper Company, Dept. MM-2, Chester, Pa.
Please send me full information on Scott Industrial Wipers.

Name _____ Position _____

Company _____

Address _____ City _____ State _____

Never Confuse the No. 8 MARVEL with an ordinary Band Saw

...only the MARVEL is Universal



Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.



Only a No. 8 MARVEL can do all of these things: Snip-off a $\frac{1}{8}$ " rod or cut-off an 18" x 18" cross section.



Rough to Size and Shape



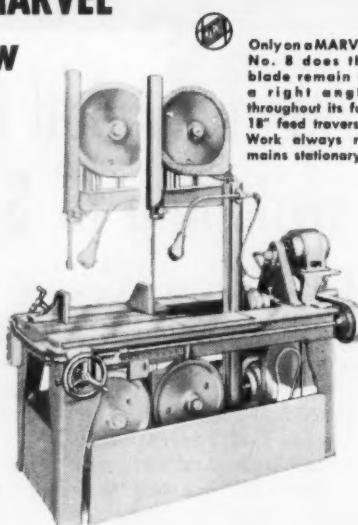
Miter



Index



Cut off and shape
Structural Beams



Only on a MARVEL No. 8 does the blade remain at a right angle throughout its full 18" feed traverse. Work always remains stationary.



Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures, Etc.

"Rough Machine" to size and shape with minimum chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stop; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

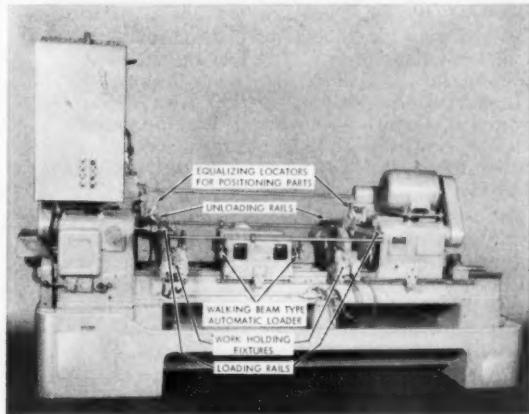
If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.



ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



MODEL CS Lo-swing FACING AND CHAMFERING MACHINE HANDLES AND FINISHES BOTH ENDS OF TUBING AUTOMATICALLY

PROBLEM: To automatically load and unload Propeller Shaft Tubes, face to length and chamfer inside and outside diameters of both ends simultaneously.

SOLUTION: The Model CS Lo-swing selected for this job was equipped with a special Automatic Handling Mechanism and special vises, as shown above. A close-up view of the working area of the machine with a rough tube clamped in the vise jaws and finished tubes leaving the machine on the conveyor rails at the rear is shown at the right.

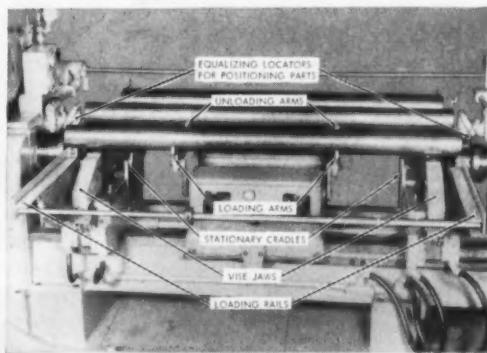
The tubes arrive at the machine by conveyor and roll down to a fixed stop on the loading rails. At the end of the machine cycle, the cutter heads retract and the vises open, allowing the finished part to drop into a stationary cradle,

which is positioned slightly lower than the center line of the vise jaws. An electrical contact then starts the work carrier motor imparting a rotating movement to the work carrier arms which handle a rough and finished piece simultaneously.

The unloading arms remove the finished piece, depositing it on the conveyor rails leaving the machine, while the loader arms, in their trajectory, pick up a rough part and lower it into the stationary cradle for automatic positioning by the equalizing locators. These locators assure removal of an equal amount of material from both ends of the tubes. The vise jaws close automatically as soon as the tube is correctly positioned. The machine starting clutch is then automatically engaged and the part faced to length and chamfered on both ends. Since the entire operation is automatic, no operator is required.

Seneca Falls engineers are at your disposal to assist in solving your AUTOMATION problems.

SENECA FALLS MACHINE CO.
SENECA FALLS, N.Y.



PRODUCTION COSTS ARE LOWER WITH Lo-swing

DRILL-SPOT FACE-COUNTERSINK-REAM-TAP

20

individual operations



...on one Part
...on one Machine
...in ten Seconds!

...that's precision
production
on a
Morris
MOR-SPEED Machine

a better product
at less cost
with precision
PLUS production



Morris

Ask your Morris representative for details on our
deferred payment plan.

THE MORRIS MACHINE TOOL CO.
934 HARRIET ST., CINCINNATI 3, OHIO

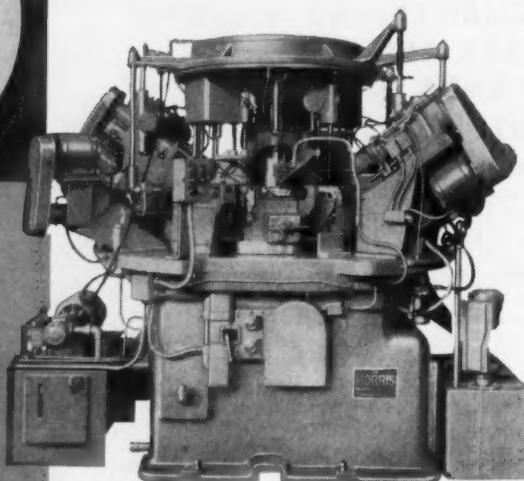
It's easy to say "the way to higher production and lower costs lies in special machinery." The sky-high price and limited application of a "special" often makes this solution impractical.

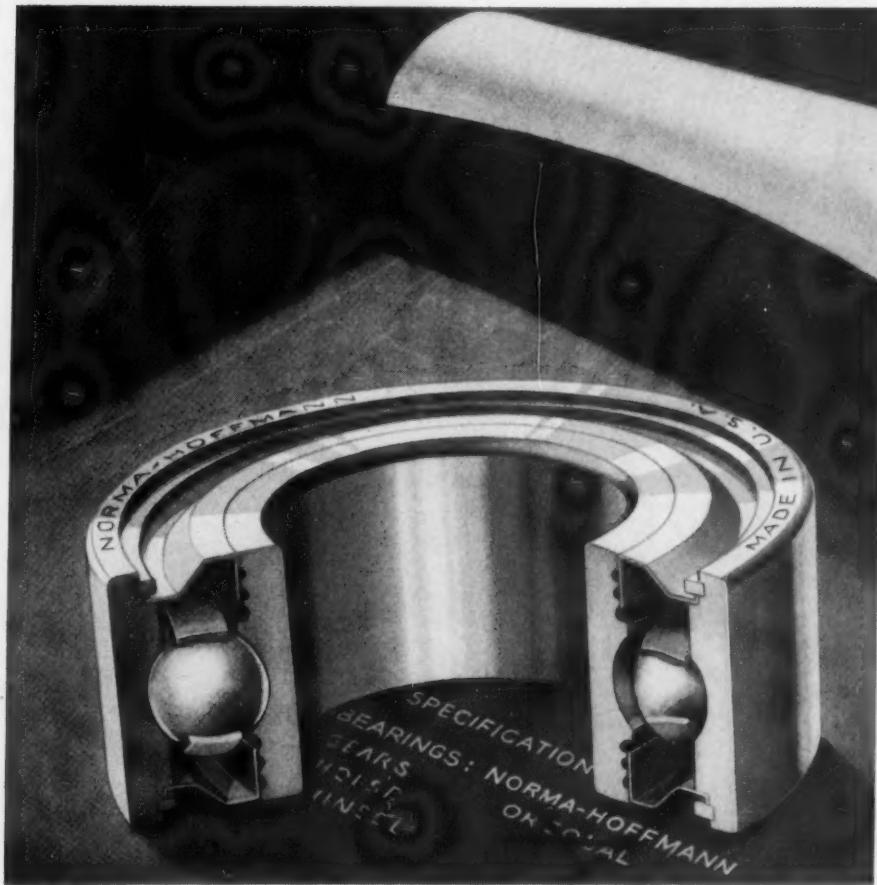
But Morris Engineers have developed a time-tested method for delivering precision production at lowest cost . . . without a staggering investment. Morris MOR-SPEED Machines combine *standard* machine units in a special design that offers all the advantages of "special machinery" without the big price tag.

The machine illustrated is a good example: standard base, standard indexing table, standard center column, standard straight and angular drilling heads, standard coolant and hydraulic units plus a minimum of special tooling. The result is "special" machine production at a very special, low cost.

Your drilling, tapping, reaming and similar operations may be adaptable to a MOR-SPEED solution. It costs you nothing to find out!

Write today for complete details.





... There Is No Equal!

Leading manufacturers endorse the patented Norma-Hoffmann "Cartridge" Bearing because it is unequalled for continuous performance and long operating life.

The highly efficient seals plus the carefully metered volume of Norma-Hoffmann's specially compounded grease combine to give this bearing its unique operating characteristics. Designers of all types of equipment know from experience that there is no equal to its long-lived, efficient performance.

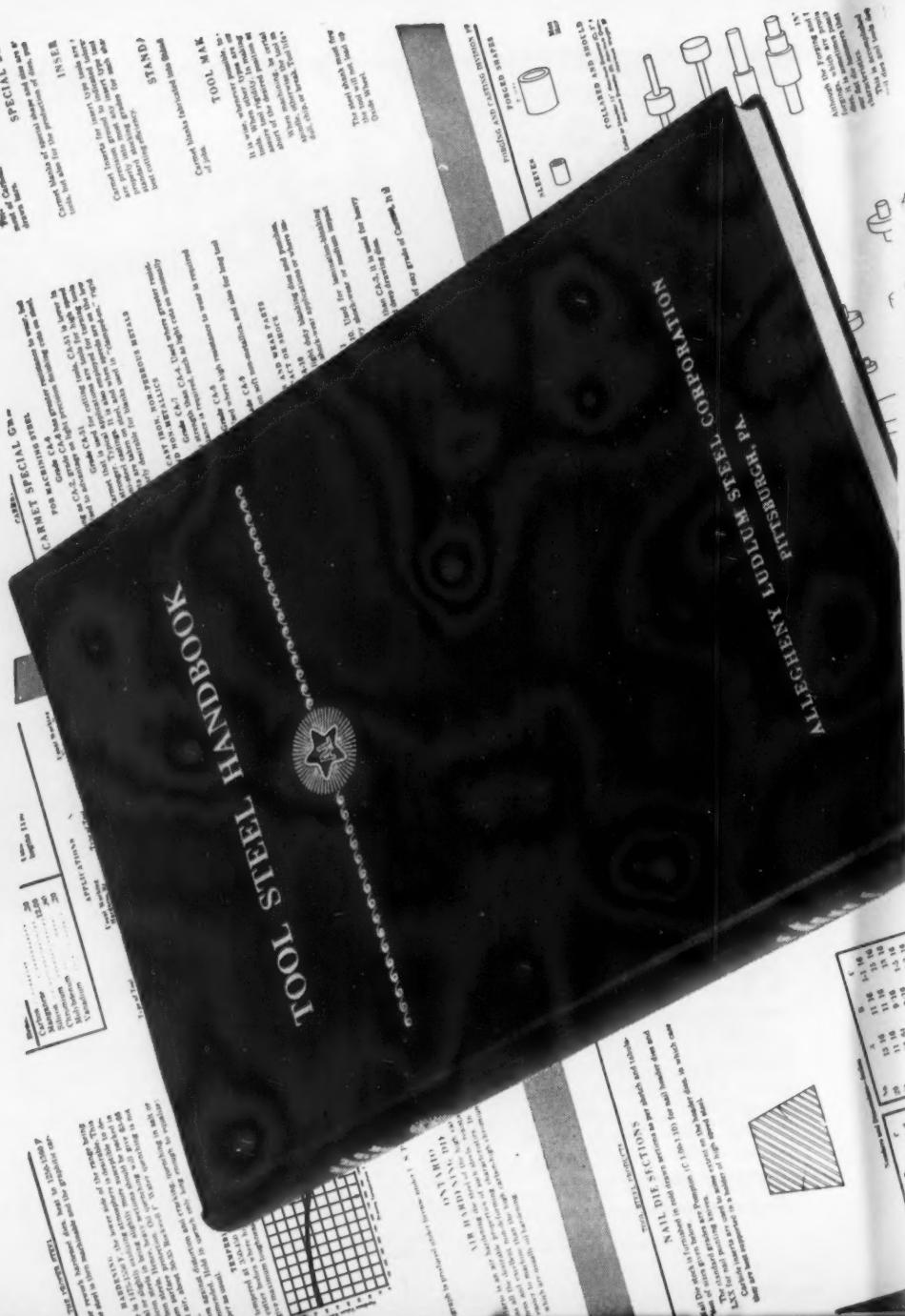
To give *your* customers greater value in *your* products,

be sure your design prints read—"Norma-Hoffmann 'Cartridge' Bearings."

NORMA-HOFFMANN
Precision
BEARINGS

BALL • ROLLER • THRUST

NORMA-HOFFMANN BEARINGS CORPORATION, Stamford, Connecticut — Founded in 1911
FIELD OFFICES: Chicago • Cincinnati • Cleveland • Dallas • Detroit • Kansas City • Los Angeles • San Francisco • Seattle





AVAILABLE NOW - 196 pages of Valuable Tool Steel Information

Another printing of our Tool Steel Handbook—one of the most comprehensive treatises of its kind ever offered by a tool steel producer—is just off the presses. In addition to a relatively complete picture of Allegheny Ludlum Tool Steels, their properties, applications and the forms in which they are available, this 196-page case-bound book presents an extensive discussion of heat treating and handling techniques

as well as a complete set of weight tables and other useful reference material.

Your copy of the Tool Steel Handbook will be sent—*without charge*—upon request. Our only stipulation: please make your request upon your company letterhead. • Write to *Allegheny Ludlum Steel Corporation, Oliver Bldg, Pittsburgh 22, Pennsylvania.*

ADDRESS DEPT. MS-59

WAD 81224



For complete MODERN Tooling, call
Allegheny Ludlum

CORRECT !

CORRECT !

$$2+2=4$$

$$3+0=4$$

in the classroom!

in the tool room!



If a \$2.00 tool must be replaced every six months, tool costs on that job total \$4.00 a year.

If, on the other hand, a \$3.00 tool will give a full year of service, you'll get \$4.00 worth of tool service—and save \$1.00 a year on tool costs as well.

In the very simplest terms, that's the reason why Apex tools are preferred for production nut running operations. Designed specifically for continuous, heavy-duty service, Apex tools cost a little more in the beginning, a lot less in the end.

Apex tools are precision-built of high carbon electric furnace alloy steel, cold broached and heat treated to withstand the severe shocks of impact service. That's the reason your tool costs will be lower when you ask for Apex nut running tools. Choose from more than 5,000 stock types and sizes of impact sockets, extensions, adapters, universal wrenches. If your requirements are special, send sketch or blueprint—we'll do our best to help you.

CATALOG 29—Specifications, drawings, illustrations of the complete Apex line of nut running tools. Write, on your company letterhead please, for your copy.

APEX

impact sockets, extensions, adapters

THE APEX MACHINE & TOOL COMPANY
1027 S. Patterson Blvd., Dayton 2, Ohio



New Hancock CHUKOLLET saved \$93.16 in set-up time for Precision Metals Corp!

"Cut our set-up time in half when we were doing an intricate rush job for our largest customer"

—says Tom James, Shop Superintendent

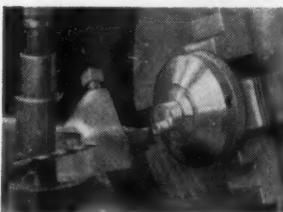
Hancock CHUKOLLET is easy to use and more versatile than any other collet chuck on the market... makes 5 C collets useful on every machine in the shop.

CHECK THESE FEATURES:

- Will not dislocate workpiece as collet is *not* drawn in while closing.
- Takes only a quarter turn to tighten or loosen workpiece.
- Holds soft-threaded and thin-walled cylindrical parts without damage for machining.
- Holds workpiece for intricate angular work.
- All critical dimensions finish-ground to instrument accuracy.
- Felt-sealed to keep dust and chips out.
- Made of Chrome-Moly Steel, hardened inside and out.

Distributors wanted. Several exclusive territories still available.

Part with irregular outside dimension is easily held in CHUKOLLET. Internal stop controls depth to .0005 inch.



CHUKOLLET set off center in 4-jaw chuck eliminating special fixture. Will machine consistently accurate eccentric parts with internal stop for positive axial location.

CHUKOLLET GUARANTEED

Money refunded within 30 days of purchase if you are not satisfied. Only

\$67.50
complete with
adjustable stop.

Mail This Coupon!

HANCOCK MFG. CO.

Dept. X
Santa Clara, California

Please send me a Hancock CHUKOLLET, post paid. I enclose \$67.50 in check or money order.

Name _____

Company _____

Address _____

City _____ State _____

SANFORD BENCH SURFACE GRINDER

MODEL SG

for Wet* or Dry Grinding!

PRECISION • SPEED • SENSITIVITY

A low cost, precision machine for surface grinding dies, instrument parts, gauges and other small parts which would fit in the palm of the hand.

By using Sanford Bench Grinders many manufacturers of precision machinery have drastically cut over-all costs for finishing small intricate parts. This releases large, more expensive machines for heavier duty work.

The Sanford SG is the only low cost Bench Surface Grinder that

- Grinds to less than .0001" tolerances
- Operates without vibration
- Assures long life because Meehanite castings are used in its construction

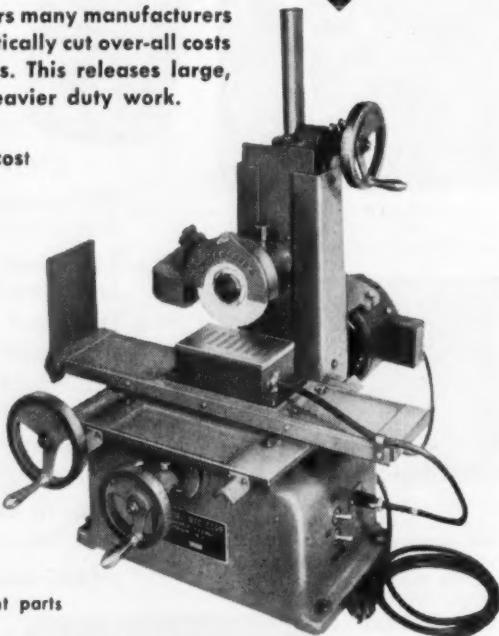
SPECIFICATIONS—4" traverse
—8" longitudinal—6" vertical
under 4" wheel. Approximate
weight 160 lbs.

Complete details are included
in illustrated bulletin.

Send for your copy today.

Reconditioning facilities, replacement parts
and special attachments are available.

Send for price list.



*With optional equipment

SANFORD MANUFACTURING CORP.
1022 Commerce Ave., Union, N. J.

For cutting everything

BARS - Rounds - and Pipes

fast, accurate, and economically

it's

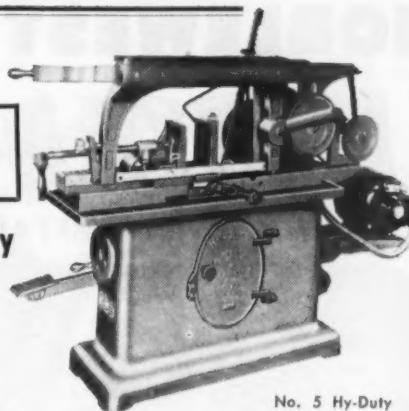
KELLER POWER HACK SAWS

10 MODELS with
Capacities $3\frac{1}{2}'' \times 3\frac{1}{2}''$ to $9'' \times 9''$

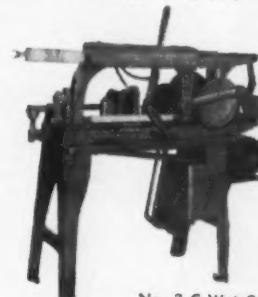
Reduce your cutting costs. Let the simple, efficient design of ten Keller Power Hack Saw models give you maximum output at a minimum investment.

More features you want from the smallest to the largest capacities to give you lower operating and maintenance costs and longer blade life.

Keller Power Hack Saws are the choice of thousands. Investigate the 10 models and you will find a Keller to meet your requirements. Write for illustrated bulletin and low prices today!



No. 5 Hy-Duty



No. 3 C Wet Cut



No. 1-HB Bench Model



No. 601 Jefferson

Sales Service Machine Tool Co.

PRESS RITE PRESSES • SHAPE RITE SHAPERS • KELLER POWER HACK SAWS

2355 UNIVERSITY AVENUE • ST. PAUL 4, MINNESOTA



NOBLEWEST *precision*

MARKING DIES

FOR EVERY METAL MARKING NEED



Flat Die for marking round pieces

Roll Die for marking flat pieces

There's a Noblewest steel marking die for rolling or stamping sharp, clear, permanent impressions into every type of metal surface—round, flat, concave, convex and irregular contours. Long the standard for quality, Noblewest dies are made of especially selected steel, precision engraved to extremely close tolerances and heat treated for extra long wear. Each is rigidly inspected and Rockwell tested for hardness. For extraordinary quality dies at ordinary prices, always specify

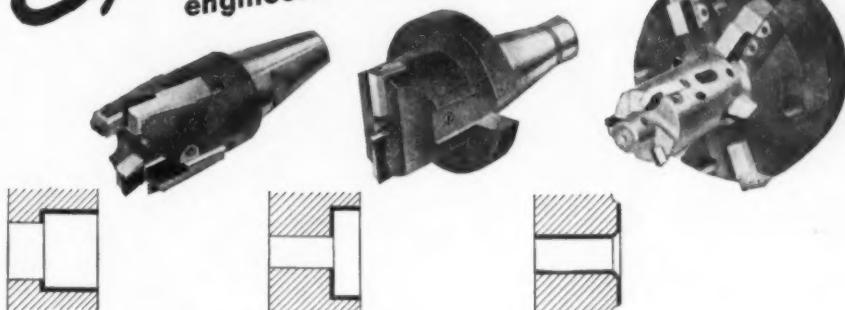
NOBLEWEST

*Send detail specifications to The Noble & Westbrook Manufacturing Company,
Westbrook Street, East Hartford 8, Connecticut.*



Special Production Tools

engineered to the job!



Combine Related Boring, Counter-Boring, Facing,
and Chamfering Operations Into Just One Tool

**PRODUCE BETTER WORK
FASTER and at LOWER COST**

- How can you keep competitive if you do four operations, when your competitor does only one?

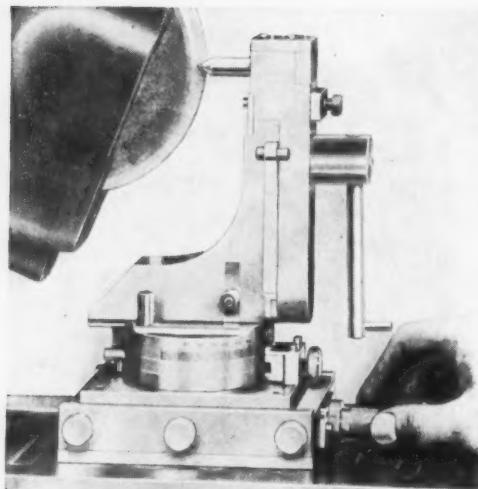
Cut your costs and increase your output with McCrosky's "Multiple Operation" specials. Engineered specially to your individual work conditions, a McCrosky Special combines 3, 4, 5 or more related operations — does them all simultaneously with one tool — and one set-up — assuring unvarying uniformity of finished product — eliminating repeated handling — reducing the amount of work in process — speeding up deliveries and producing other economies so great that they pay their way even on moderately short runs.

Write for Bulletin No. S-18. It can really save you money!

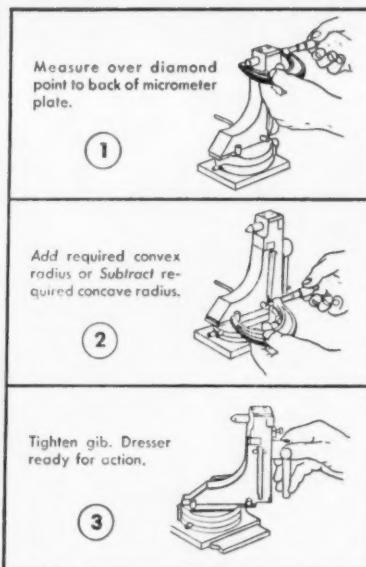


McCROSKEY **TOOL**
CORPORATION
HEADVILLE, PA.

Engineering and Sales Representatives in the Principal Cities



YOU CAN DRESS WHEELS UP TO 24" IN DIAMETER WITH J & S "FLUIDMOTION" WHEEL DRESSERS. MODEL REC SHOWN HERE.



How to set angles in seconds, radii in minutes—save hours

These easy instructions show you how you can with a
J & S "Fluidmotion" Wheel Dresser

Dressing wheels with a J & S "Fluidmotion" Wheel Dresser is easier than you might think. All you need is a micrometer and simple hex wrench. With a little practice, you can set 2 angles in about 10 seconds, a radius in just 2-3 minutes. Here's how to go about it:

To Obtain One Angle

Adjust center line of grinding wheel to height of diamond. The swivel base of the dresser is graduated at 10° on each side of center. Loosen knurled knob and hold both pins which protrude from bottom rings. Then simply set desired angle, tighten the knurled knob, and you're ready for action.

To Obtain Two Angles

Loosen knurled knob and set the pin on the *bottom ring first* for one angle. Then move pin on the middle ring for the other angle. Tighten the knurled knob—that's all there is to it.

To Obtain a Convex Radius on Grinding Wheel

Measure master reading over diamond point to back of micrometer plate (drawing #1) . . . for example . . . 2.531
 Add required convex radius (drawing #2) . . . + .069
 Setting for micrometer pins . . . 2.600

To Obtain a Concave Radius on Grinding Wheel

Measure over diamond point to back of micrometer plate (drawing #1)... for example 2.900"
Subtract required concave radius (drawing #2) - 2.142"

Setting for micrometer pins..... 758

Tighten gib. Dresser now ready for action (drawing #3)

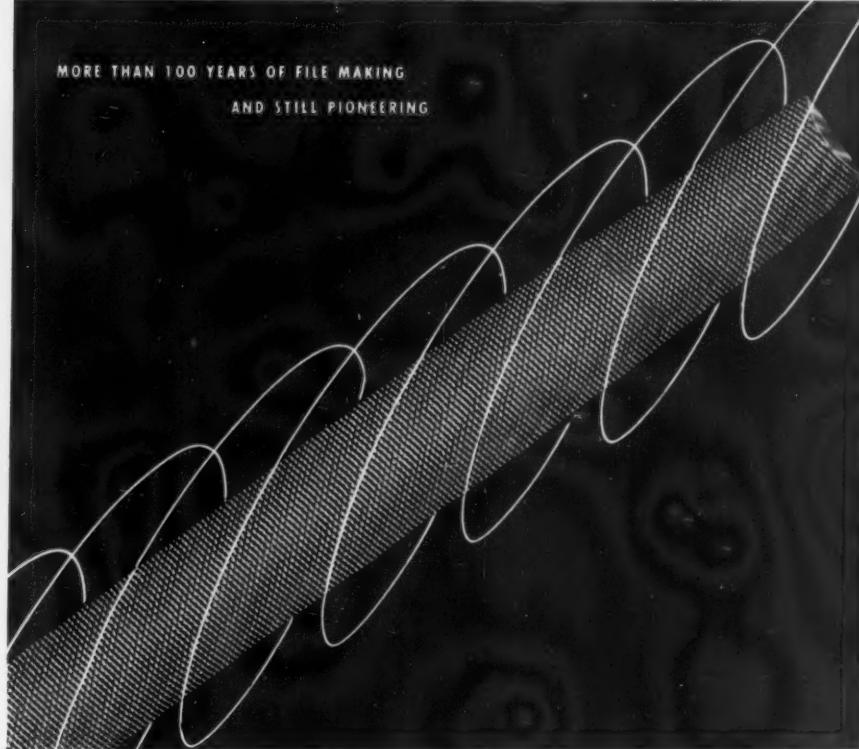
How much time and trouble can a J & S Wheeled Dresser save you? Figure it up. Then write us for complete information.



WHEEL DRESSERS • JAW CLAMPS • PRECISION VISES • SINE BARS • DOWN-HOLDING DEVICES

645 W. MT. PLEASANT AVE., LIVINGSTON, NEW JERSEY

MORE THAN 100 YEARS OF FILE MAKING
AND STILL PIONEERING



HELLER WAS FIRST WITH SPIRAL-CUT HALF ROUND FILES

Ordinary half round files require a skillful twisting of the file to produce smooth, even work. Heller engineering has removed this human element from good file performance with exclusive Spiral-Cut Half Round Files. The necessary "rolling action" is designed right into the file. This new cutting principle is typical of Heller's continuous search for better files. By constantly testing, inspecting, improving . . . Heller guarantees file users "the best."



THESE 3 FAMOUS BRANDS ARE MADE ONLY BY

HELLER BROTHERS CO. America's Oldest File Manufacturer NEWCOMERSTOWN, OHIO



other Heller *First*

NUCUT® Wavy-Tooth Files

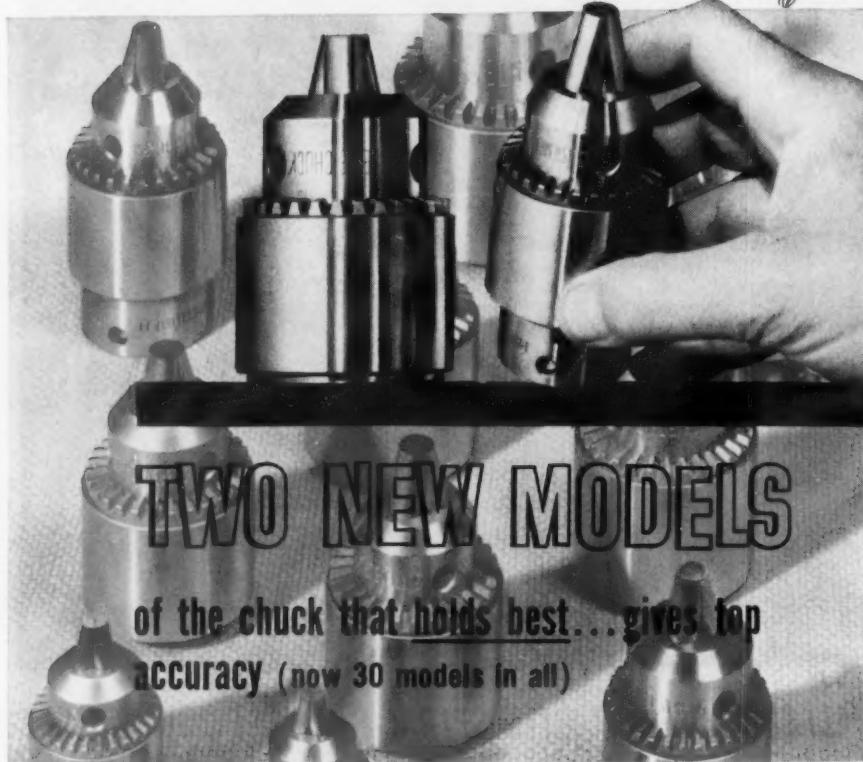
VIXEN Milled Curved Tooth Files

WAVY-TEETH® Double Cut Mill and Saw Files

*Registered T.M.

YOUR HELLER DISTRIBUTOR CAN SUPPLY ALL YOUR FILE NEEDS

SUPREME is on the grow!



TWO NEW MODELS

of the chuck that holds best... gives top
accuracy (now 30 models in all)

Industry has been asking for them. Now, after the most exacting on-the-job tests, Supreme Products, Inc. announce the addition of two new large capacity Supreme Brand Chucks to their ever-expanding line. They are:

- (1) Model No. 9T3 with 3/16" to 3/4" capacity.
- (2) Model No. 15T33C, 0" to 1/2" capacity drill press chuck with ball bearing lock collar.

With these two new chucks, Supreme now has a total of 30 separate and distinct models for the industrial and O.E.M. user to choose from. It means that the

extra performance of Supreme is now available to virtually the entire metalworking industry. See and try Supreme Chucks. Learn why Supreme Chucks have become standard equipment on so many of the products of America's foremost tool manufacturers.

Supreme Chucks
BRAND

SUPREME PRODUCTS, INC., 2222 So. Calumet Avenue, Chicago 16, Illinois

When All Is Said And Done...

Which gage manufacturer has consistently produced the most complete line of modern gages?

Ever since Federal offered its first Dial Indicator, 37 years ago, this company has consistently lead the way in improvements, new instruments, and new methods of gaging. First to realize the value of Quality Control by Statistics, Federal was also first to promote its use by educating men all over the country in its application.

On the other hand, Federal has consistently weighed new ideas and rejected hundreds that would not stand up to requirements, which proves that not all *new* ideas are *practical* ideas.

Federal concentrates on the design and manufacture of dimensional gages — not only a wide variety of Indicator Gages but also the most advanced type of Air Gages, Electric, and Electronic Gages — for continuous measuring, automatic sorting, and automatic dimensional control of parts produced on machine tools.

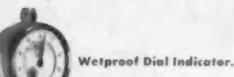
It's easy to investigate Federal Gages. Catalog 52 and our price list tell the whole story.

FEDERAL PRODUCTS CORPORATION
41411 Eddy Street • Providence 1, R. I.

Ask **FEDERAL**
FOR ANYTHING IN MODERN GAGES...

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting or Automatically Controlling Dimensions on Machines

205 Hole Location Gage.



Wetproof Dial Indicator.



BBP Series Universal I.D.
and O.D. Shallow Diameter Gages.



Adjustable I.D.
Groove Gage.



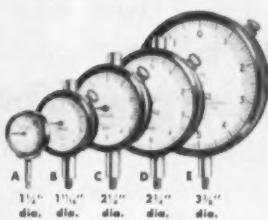
Indicating
Crankshaft
Gage
Model
1340 P-40.



Regular Testmaster.



200P-1 Indicating Micrometer.



A 1 1/2" dia.
B 1 1/2" dia.
C 2 1/2" dia.
D 2 1/2" dia.
E 3 1/2" dia.

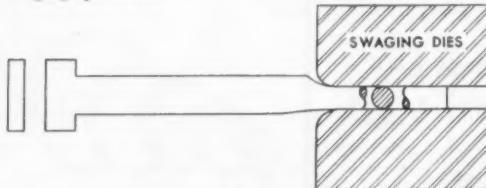
Regular Dial Indicators
Greatest Selection of Dial Graduations.



The application of the swaging process to the forming and finishing of metal stampings has almost unlimited possibilities. Here is an example.



Flat stampings like this one can be given rounded sections, accurately sized, without turning or grinding, by one simple swaging operation.



Can Swaging Improve Your Forming Operations?

1. Swaging is economical—no chips, no wasted material
2. Swaging is simple—can be done by unskilled labor
3. Swaging is fast—gives you increased output of special shapes

*Our informative booklet on
Swaging may give you
other ideas for your own
"swaging success story."
Why not write for it today?*



THE TORRINGTON COMPANY
Swager Department
730 North Street, Torrington, Conn.
Makers of Torrington Needle Bearings

TORRINGTON **ROTARY SWAGING** **MACHINES**

55% more powerful, yet lighter in weight!

New SKIL $\frac{1}{4}$ " Model 75 Drill

More Rugged! More Comfortable in Use!

Cuts Costs! Easier to Operate!

More Efficient!

Boosts Production!

Just one trial of this new SKIL drill will prove its advantages to you: For here's a husky, heavy-duty drill that's 55% more powerful while it's actually *lighter* in weight!

In the SKIL Model 75 you'll find really outstanding performance combined with top operating power, longer operating life. A choice of 7 speeds available, from 500 to 5,000 r.p.m. . . . depending on your individual work needs. Capacity: $\frac{1}{4}$ " in steel, $\frac{1}{2}$ " in wood. Have your distributor show you the SKIL "75" now!



NEW! SKIL Drill Model 78—Compact standard duty drill with $\frac{3}{8}$ " capacity in steel ($\frac{1}{4}$ " in wood). Ideal for general purpose drilling. Produces high torque at 750 r.p.m. for tough jobs. Equipped with removable auxiliary side handle.

LOOK OVER THESE IMPORTANT FEATURES!

- All anti-friction bearings—for greater efficiency and low maintenance.
- Motor 55% more powerful, yet lighter than previous models.
- Contour-fit handle for easier, more comfortable handling.
- Larger inspection plates, easily removed for checking and cleaning.
- New molded rubber strain relief—protects cord against fraying or breakage at drill cord attachment joint.
- Handy, safety-designed trigger lock for continuous operation—side location for easy operation.
- Convenient chuck key holder on cord.

FREE! Send coupon! Let your SKIL Distributor prove to you—with a remarkable demonstration and free trial—that "SKIL is the answer" to your production bottlenecks!

SKIL
PORTABLE TOOLS

Made only by SKIL Corporation
Formerly SKILSAW, Inc.

5033 Elston Avenue, Chicago 30, Illinois
3601 Dundas Street West, Toronto 9, Ontario
Factory Branches in All Leading Cities

SKIL Corporation, Dept. MMS-114
5033 Elston Avenue, Chicago 30, Illinois

I would like a demonstration and trial . . . FREE!
 Please send me illustrated literature on SKIL Drills!

Name _____

Company _____

Street _____

City _____ Zone _____ State _____

FASTER FINISHING

at less cost!



CP Hicycle Portable Electric Tools for grinding, sanding, buffing and polishing not only finish products faster but they increase man-hour productivity — and at far less cost!

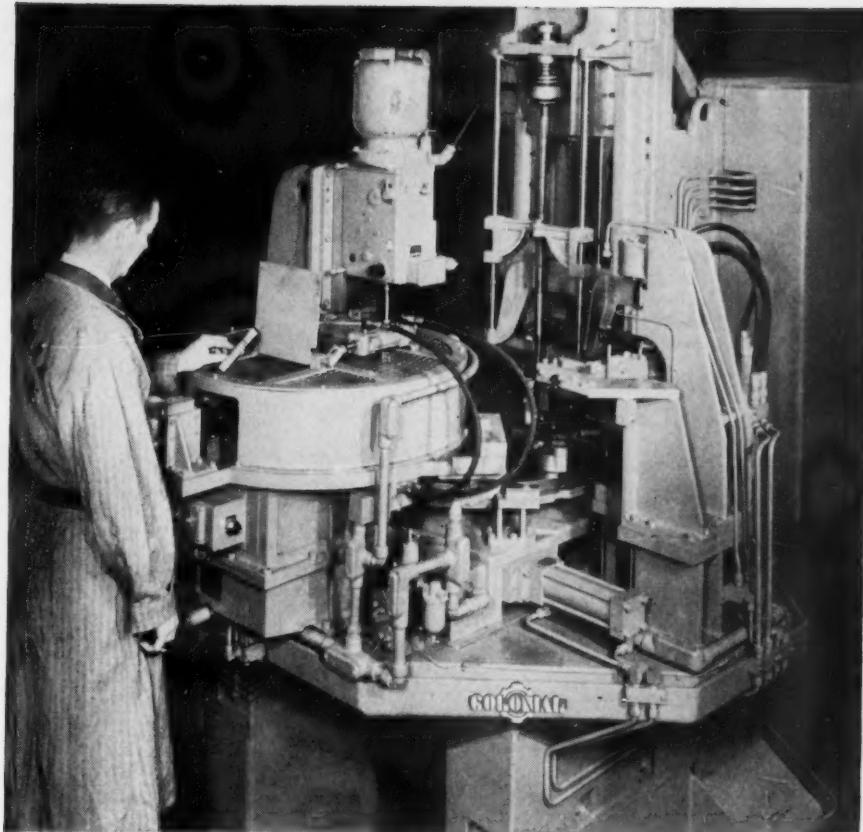
Lightweight CP Hicycle tools operate under constant speed — there's no sag under full load. Hicycle induction motor and rugged design assure low-cost power and long service life with minimum maintenance . . . has a solid rotor, no armature to burn out . . . no commutator or brushes to replace. Write for details.

Chicago Pneumatic Tool Company,
8 East 44th Street, New York 17, N. Y.



Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



BROACHING—"PLUS"

200 finished pieces per hour

This Colonial 6-ton 24-inch stroke pull-down machine, broaches, drills and stamps more than 200 camshaft sprockets per hour. Cycle is completely automatic as follows: 1) drill .2656" hole in web, 2) broach .1895" keyway in bore, 3) stamp timing mark on sprocket, 4) eject completed parts onto a conveyor. Operator merely keeps loading magazines filled with parts.

Broaching—"Plus" is a new trend in broaching machines today. Integrating broaching into a

machining sequence on a part, so that the operator has less work handling, cuts costs and speeds up processing.

Colonial Broaching—"Plus" machines can perform multiple operations on your parts. For information on how your costs can be cut, send your prints and production requirements to Colonial Broach Company's Engineering Department.

UNIFIED BROACHING is the key to successful broaching





BOY! These Wheels Do Everything!

Just tell your dealer you want to try a couple of rubber-cushioned Brightboy wheels, that *burr, clean, finish, polish, in one operation*.

They'll save you up to 50% in finishing time on metals, plastics and laminated materials.

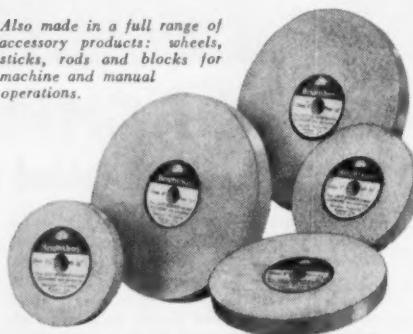
Like thousands of enthusiastic production men, you'll find applications for rubber-cushioned Brightboy that you never thought one abrasive could achieve. Its adaptability is amazing, going far beyond other methods. It gives you an entirely new, wider, refreshing concept of finishing.

NEW! Stock abrasives "matched" to your particular finishing requirements. Rubber-cushioned Brightboy now available in either ALUMINUM OXIDE or SILICON CARBIDE GRAIN. AND—Each of these texture combinations comes in GRAIN SIZES ranging from EXTRA FINE to EXTRA COARSE in SOFT, FIRM and TOUGH RUBBER BINDERS.

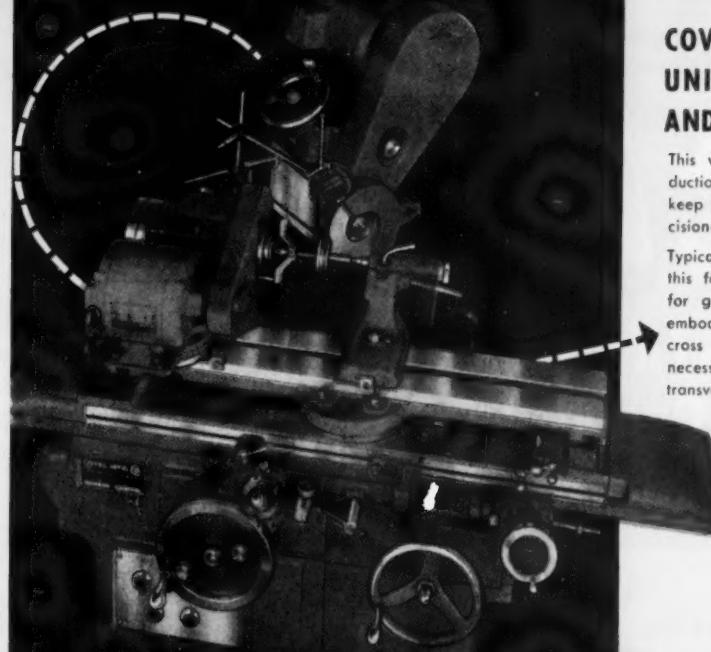
TRY A TEST!

Get all the facts on Brightboy rubber-cushioned finishing from your dealer. Ask him for Brightboy literature. Write us if he cannot supply you. Get our advice on any problem where finishing is involved.

Also made in a full range of accessory products: wheels, sticks, rods and blocks for machine and manual operations.



BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
95 North 13th Street • Newark 7, N. J.
America's Pioneer Manufacturer of Rubber-Bonded Abrasives



PRODUCTION Starts IN THE TOOL ROOM

Look to your tool room — where production starts — and see whether your tool-makers and set-up men are hampered by obsolete, inaccurate and wasteful grinding equipment. Poorly ground tools and cutters handicap production every step of the way — through inferior results, costly rejects, loss of valuable time, expensive tool waste.

If your cutter and tool costs are high, perhaps you are paying for Covel quality without enjoying its many profit-saving advantages . . . and if so, now is the time to call on Covel for the answer. We will be pleased to send complete information.

80 YEARS of
continuous manu
facturing experience
makes your COVEL
choice a sound one



COVEL PRECISION GRINDERS
BENTON HARBOR, MICHIGAN

DRILL GRINDERS • UNIVERSAL CUTTER & TOOL GRINDERS • HYDRAULIC & HAND FEED SURFACE GRINDERS

COVEL NO. 12 UNIVERSAL CUTTER AND TOOL GRINDER

This versatile machine can get production off to a flying start — and keep pace with a steady flow of precision-ground, highly efficient tools.

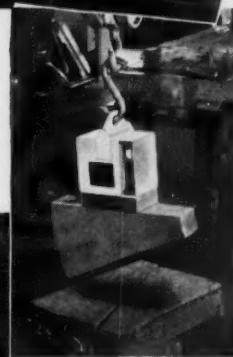
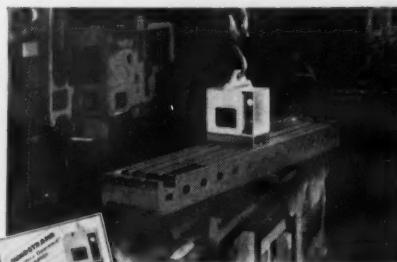
Typical of No. 12's universal scope is this form grinding attachment set-up for grinding circular form tools. It embodies fine longitudinal feed — fine cross feed; for the extreme accuracy necessary for both longitudinal and transverse movement.

Write for
12-page detailed
Bulletin M-114





Here's the new Model 50 Sundstrand self contained lift magnet with a lifting capacity of 2,000 lbs. It eliminates chain or rope hitches and length of haul is not restricted by cords or wires. It's operated by a 6 volt wet cell automobile battery. A recessed control panel contains an operating switch, a dial to indicate the need for re-charging and a receptacle for a trickle charger plug. It has a 7" x 12½" magnetizing surface and weighs only 120 lbs.



Left, milling machine table being lowered into position on machine base.

Above, odd shaped parts are easily handled with Sundstrand Lift Magnet.



FREE DATA Write for complete information on this new efficient "Battery Operated" lift magnet. Ask for bulletin 549-M.

SUNDSTRAND
Magnetic Products Co.

Division of Sundstrand Machine Tool Co.
1020-9th ST. • ROCKFORD, ILLINOIS

For greater ACCURACY, RANGE, SPEED in grinding perforators!



A few examples
of perforator
shapes that can
be made faster
and easier with
Grind-All.

Patent No.
2449459

Harig
Grind-All
Fixture

Easier movement now
possible with new pre-
loaded ball bearing
type of construction.

With the Harig Grind-
All fixture, you make perforator grinding
setups THREE TIMES FASTER —
grind a variety of regular and irregular
contours with the greatest possible
accuracy and widest operating range.
Exclusive radius generating feature
makes fixture particularly adaptable
to carbide grinding.



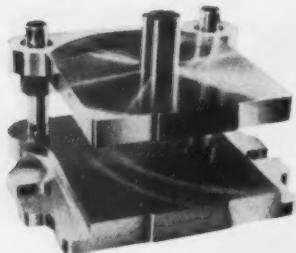
For details on
service and
facilities, send
for the fully
illustrated
Harig Catalog.

Harig

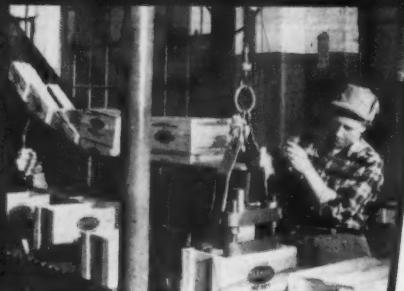
Manufacturing Corp

3765 W. HOWARD ST., CHICAGO 31, ILL.

Fastest die set service ever



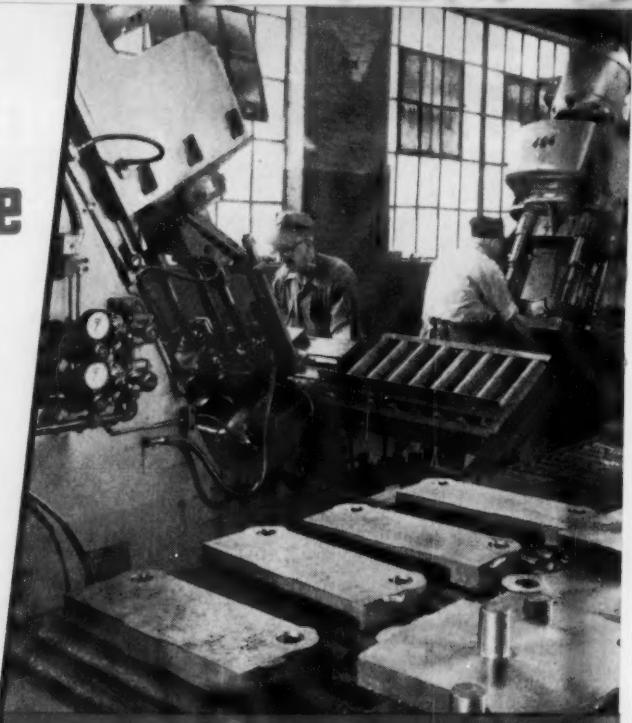
... made possible by Danly's unique
mass-production and distribution system.



At your Danly Branch plant . . . shipping die sets to
your order. Up-to-date procedures and facilities
assure fastest delivery.



DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue
Chicago 50, Illinois



At the main Danly plant . . . high speed precision drilling. Interchangeable fixtures accommodate the full range of standard die set sizes.

To make your tooling program move faster, Danly mass produces interchangeable, precision die set parts . . . stocks them at your local Danly Branch ready for quick assembly to your order and delivery to you. With Danly, from the time you place your order until the set is delivered to you is a matter of only a few days. This extra fast delivery starts at the main Danly plant in Chicago where two complete high-speed production lines turn out a wide variety of precision die set parts. Held in ample stock by your local Danly Branch, these interchangeable parts are assembled to your order and delivered immediately. Don't let lagging die set delivery bog down your tooling program. Order from your Danly Branch and get the fastest service . . . ever.

Fast, nationwide delivery from these branch plants

*CHICAGO 50	2100 South Laramie Avenue
*CLEVELAND 14	1560 East 33rd Street
*DAYTON 7	3198 Delphos Avenue
*DETROIT 16	1510 Temple Avenue
*GRAND RAPIDS	113 Michigan Street N.W.
INDIANAPOLIS 4	5 West 10th Street
*LONG ISLAND CITY 1	47-28 37th Street
*LOS ANGELES 54	Ducommun Metal Supply Co., 4500 South Alameda
MILWAUKEE 2	111 East Wisconsin Avenue
*PHILADELPHIA 40	511 W. Courtland Street
*ROCHESTER 6	33 Rutter Street

*Indicates complete plant

save 80% of boring time



DEKA BORE



DEKA-BORE (and only DEKA-BORE) can be adjusted in fractions of $1/10,000"$ on the full diameter as easily as reading $1/16"$ on a steel rule. NOT A VERNIER OR SCROLL ADJUSTMENT. Can be calibrated in increments of .00005 on radii or .0001 on diameter as easily as picking up .002 on a conventional micrometer dial.

100% GUARANTEED!

mail coupon now for free demonstration or literature!

PRECISION TOOL & MFG. CO. OF ILL.

1305 South Laramie Cicero 50, Illinois

Gentlemen: Please send me

Name of nearest DEKA-BORE distributor, who will arrange free demonstration.
 Free literature and prices.

NAME _____ TITLE _____

FIRM _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Why use a Koil-Kradle?

benchmaster

Koil-Kradle

with VARI-LOOP Control

KOIL-KRADLE makes available a *controlled length of slack loop* from which any machine can draw...shuts off automatically when loop exceeds machine requirements.

KOIL-KRADLE CUTS COSTS!
Uses much larger coils; lowers stock costs; eliminates frequent reloading. This means more press time, more production, more profit.

LICKS LOADING PROBLEMS—
No heavy lifting, no time-consuming problems...simply roll coil up ramp into cradle position.

SAVES VALUABLE FLOOR SPACE—No need for 8 to 10 feet of wasted space...KOIL-KRADLE butts against any machine it supplies. Compact, occupies only a few feet of floor space itself!

**Write for free circular or
see your Benchmaster dealer.**

Benchmaster
Manufacturing Co.
1835 W. Rosecrans Ave.
Gardena, California

IMPROVED AUTOMATION
FOR PUNCH PRESSES,
SHEARS, SLITTERS,
ROLL FORMERS and all
similar machines fabricating
from any coiled stock.



MANY SIZES:

Capacities from $\frac{1}{2}$ ton to
8 tons, coil diams. 36" to 60",
stock widths 10" to 48".

benchmaster

World's largest
manufacturer of small punch
presses and mills.

FILTRATION for AUTOMATION

Delpark MAKES AN ASSIST ON Quality Control AT IBM

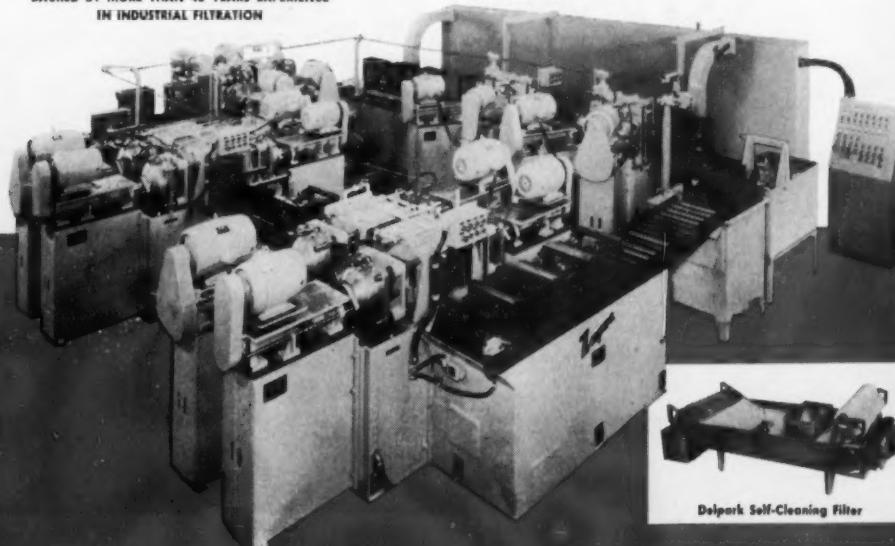
These Zagar pallet-type transfer machines at IBM perform numerous drilling operations on aluminum frames for the famous IBM typewriters.

Here is a fine example of Automation . . . and backing up this unit is automation in filtration. You won't see it in the picture, but . . . Delpark filtration cleans coolant from the 206 drill spindles. Greater accuracy of drill hole size, longer drill life, more efficient tool operation are but a few of the major savings gained through Delpark filtration. Delpark is one reason why up to 144 parts per hour are handled on this unit with but two operators. Credit IBM and Zagar tool engineering for foresight . . . credit IBM tool service for production know-how . . . credit Delpark for filtration as modern as today's automation.

For your filtration problems . . . for automation or normal procedure . . . contact Delpark for competent field engineering. There's no obligation. Write today.

DELPARK INDUSTRIAL FILTRATION

BACKED BY MORE THAN 40 YEARS EXPERIENCE
IN INDUSTRIAL FILTRATION

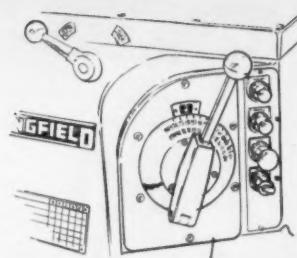


Delpark Self-Cleaning Filter

INDUSTRIAL FILTRATION COMPANY, 13 INDUSTRIAL AVENUE, LEBANON, INDIANA

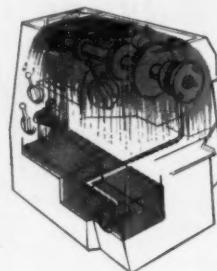
it does more work (and the operator does less)

Simple, least-effort controls: color-coded dial selection of 24 spindle speeds; four levers for totally enclosed gear box; tailstock wheel set at angle for easiest operation; wheel has two speeds, one for normal operation, one for drilling; chip pan on casters for quick movement to insure cleaner, safer floors.



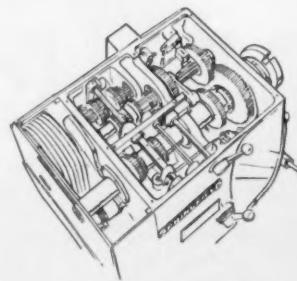
it runs cooler

Continuous oil-mist lubrication of all headstock gears does more than lubricate; it carries heat away into large sump in headstock leg. Cooler head minimizes distortion during warmup; markedly improves accuracy and stability of work alignment.



it saves power, cuts wear

The headstock has only four gears in mesh at once for any speed. Other gears run free; flywheel action adds to stability. No "pass-through" gears in shifting.



it promotes cleanliness—and safety

Clean modern design encourages good shop practices, better maintenance; builds pride in workmanship and better quality in work produced.

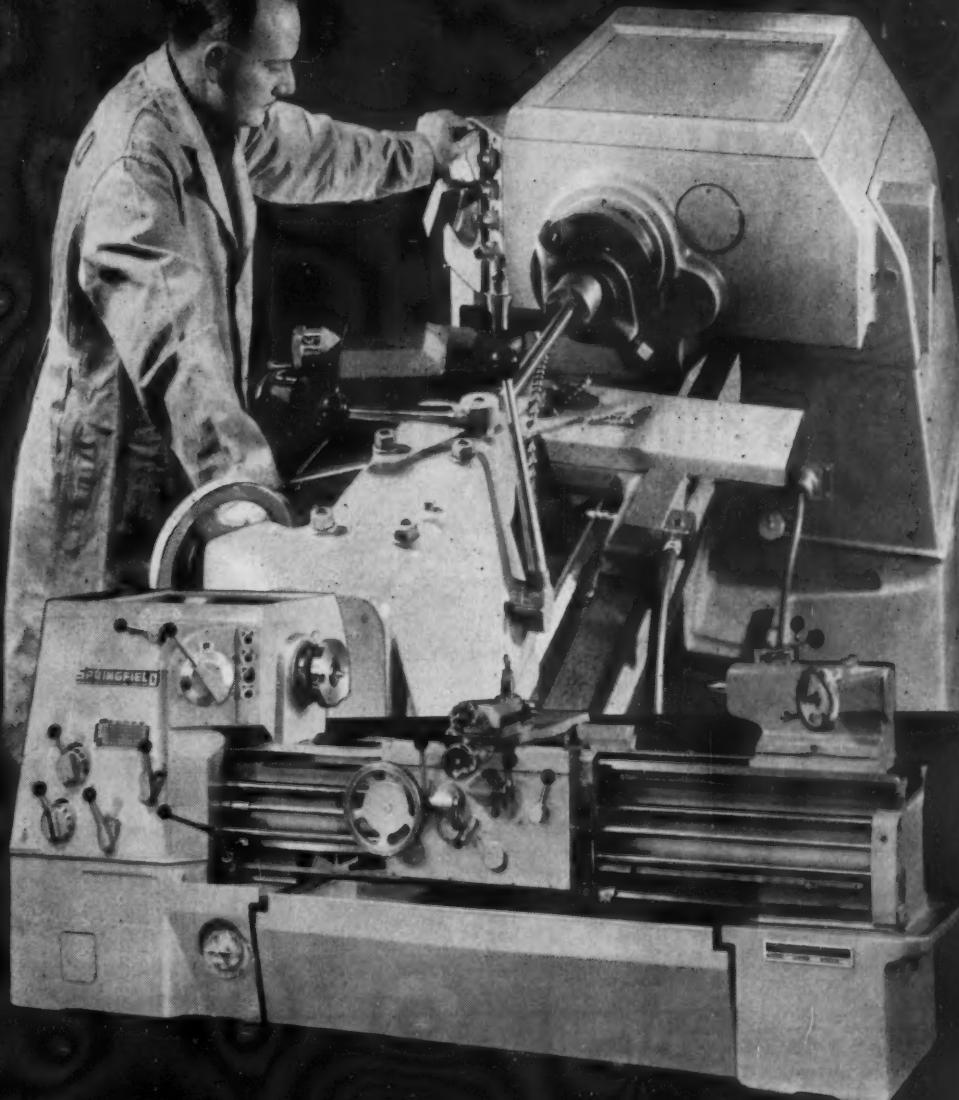
Engine and toolroom lathes:
swings 14" to 32"

Contouring and reproducing lathes:
swings 14" to 32"

Universal vertical grinders:
swings 21" to 52"

write for name of your nearest dealer

because it's simple



*67th year of building
ideas into machine tools*



'CHEAPER BY
the thousand'

HASSALL Cold Headed Parts and Fasteners

Our BIG BUSINESS is making small parts by the thousands . . . cold forged parts which are usually lowest first cost, lowest assembly cost and strongest for longest service life.

A quotation from us won't cost you a cent but it's very likely to show you a much LOWER COST source of supply for any small metal part or fastener you are using in your product. We cold head any metal.



NEED a good 3 color decimal equivalent chart? Yours without obligation . . . just drop us a card. Complete catalog on request.



JOHN HASSALL, INC.

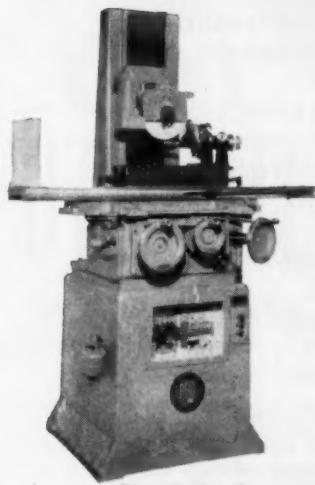
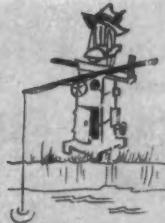
P. O. Box 2177

Westbury, L. I., New York



"How about a RETIREMENT PLAN for OVER-AGE Grinders?"

Actually it's a sensible idea! For recent surveys show that ONE out of every FIVE grinders now in operation is eligible for retirement, being incapable of meeting today's precision tooling standards.



Rather than pay a heavy premium in efficiency and profits, modern management finds that it makes sense to put over-age machines out to pasture, replacing them with REID Surface Grinders . . . for REID Grinders are famed as precision Grinders, preferred by industry for dependable accuracy.

Your REID Dealer will show you how easy and economical it is to replace over-age Grinders with modern, efficient, REID Precision Surface Grinders.

PLAN NOW FOR REPLACEMENT

with **REID GRINDERS**

For the complete story on Reid Surface Grinders please write for Bulletin 618-12.

Reid Brothers

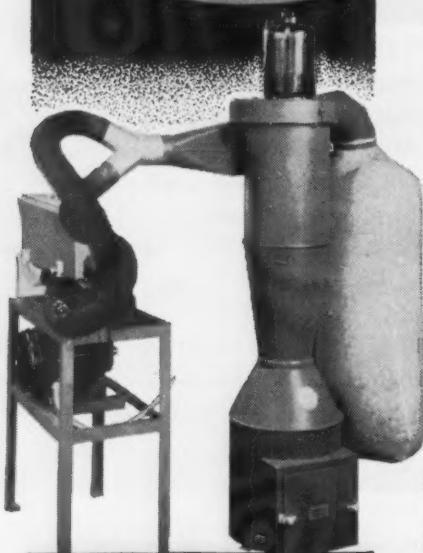
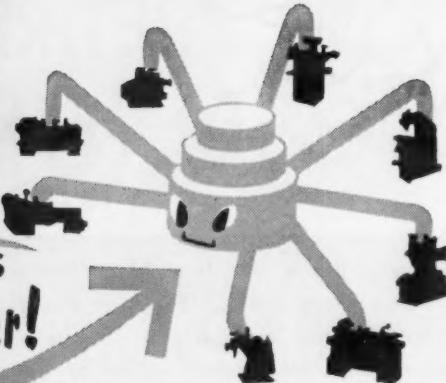


Company, Inc.

BEVERLY, MASSACHUSETTS

TORIT UNITIZED DUST CONTROL

ELIMINATES
the Spider!



TORIT
MANUFACTURING
COMPANY

With Torit Unitized Dust Control You...

- ✓ get custom installed units tailored to each dust creating machine.
- ✓ eliminate bother, expense and overhead of centralized control.
- ✓ operate units only when necessary.
- ✓ eliminate waste of power and suction by machines not operating.
- ✓ eliminate the dust problem at its source . . . where it should be stopped.

Furthermore, Torit designs these units to suit *your* requirements. No matter what your dust problem, Torit can solve it.

Our engineers will be happy to call on you, without obligation on your part, to show you how you can use Torit Unitized Dust Control to your advantage in plant efficiency and ultimate profits.

See our catalog in Sweet's
Machine Tool File, or write:
296 WALNUT STREET, ST. PAUL 2, MINN.

*It's
Here...*

the
NEW
CUTMASTER

Model 75

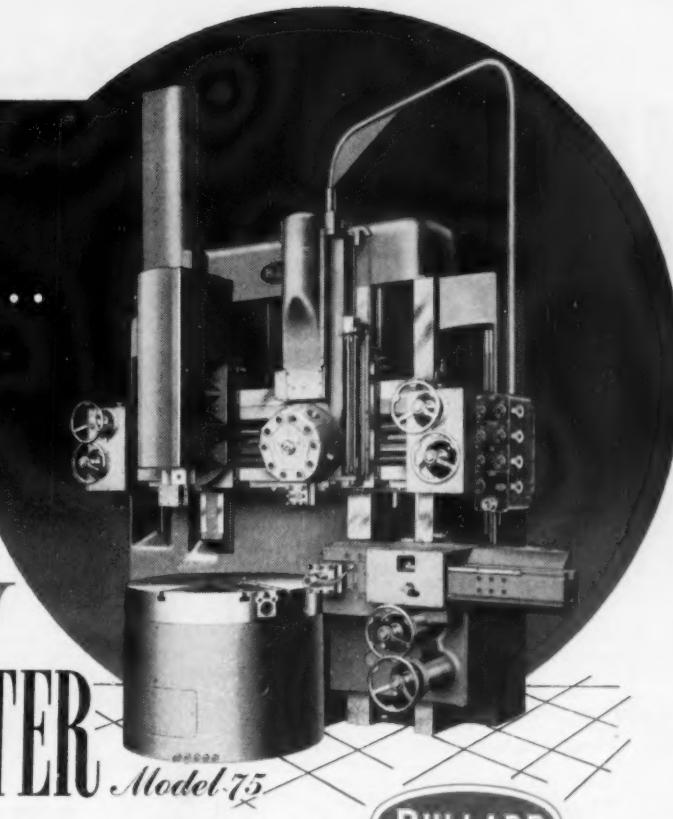
A COMPLETELY NEW DESIGN OF
VERTICAL TURRET LATHE

This new line has been engineered and designed to take full advantage of
the latest improvements in cutting tools, methods and materials.

Here are some of its features:

- ★ **PENDANT CONTROL**, exclusive Bullard design, for maximum machine control from a movable pendant station. Start and stop spindle; selection of speeds, feeds and directional movement of all heads in feed or traverse are quickly and easily accomplished from the Pendant. Interlocks and a stop-all stick provide safety for both operator and machine.
- ★ **ELECTRIC CONTROL PANEL** — Accessible yet concealed and protected from oil, dust and other foreign matter.
- ★ **IMPROVED CUTTING COOLANT SYSTEM** — Adjustable conductors with flexible hoses for channeling coolant directly to cutting tools and adjustable heavy gauge steel guards designed for easy chip removal.
- ★ **POWER INDEXED MAIN TURRET**—(Optional)

Available in 26, 36, 46, 56, 66 and 76 inch sizes
for shipment to you early in 1955.



BULLARD

For the complete story

use this coupon for

your copy of the new catalog.



THE BULLARD COMPANY

286 Canfield Avenue • Bridgeport 2, Connecticut

Please send me a copy of the new Bullard Cut Master
Vertical Turret Lathe Model 75 Catalog today.

NAME _____

COMPANY _____

ADDRESS _____

CITY _____

POSITION _____

ZONE _____ STATE _____

It's here...the NEW DUMORE AUTO

**The most complete unit for its size
and capacity on the market today!**

More ALL-STAR mass production features! More ALL-STAR cost reduction features! See how much this Dumore unit offers!

- ★ Easy mounting in any position.
- ★ Built-in controls for manual, semi-automatic and automatic operation.
- ★ Positive, no-slip spindle drive with ten selective spindle speeds.
- ★ Economical low-air-volume operation.
- ★ Air and hydraulic systems completely separate—minimizes maintenance.
- ★ Keeps tooling simple — tooling costs low.
- ★ Individual unit control provided in multiple unit set-ups — for rapid tool changes or job conversions.
- ★ When mounted on a standard drill press column, the unit be-

comes a self-contained, automatic drilling and tapping machine.

- ★ Full 3" stroke with depth adjustment to within $\pm .001"$.
- ★ Built-in auxiliary circuits for automatic activation of transfer equipment, indexing fixtures, other drill units for sequence operation in multiple set-ups.

PLUS THESE OPTIONAL ACCESSORIES:

- ★ DUMORE REPEAT CYCLE TIMER — for automatic stage drilling and tapping of deep holes — providing automatic chip clearance, better holes, less drill and tap breakage.
- ★ DUMORE HYDRAULIC CONTROL (optional) . . . for quick insertion or removal. Provides rapid approach, controlled feeds through work.

★ A variety of mounting accessories is available for adapting to existing or specially designed equipment.

SPECIFICATIONS:

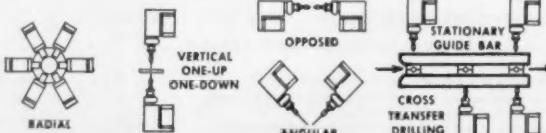
Dumore Automatic Drill Unit

WIDTH: Approx. 9 $\frac{1}{2}$ " • HEIGHT: approx. 15" • LENGTH OVERALL: (Incl. chuck) 24" • WEIGHT: (Incl. motor) approx. 88 lbs. • FEEDS: Adjustable from 25 to 400 lbs. thrust • RAPID APPROACH RATE: Adjustable up to 600-in. per min. (Distance adjustable from 0" to full stroke.) • AVAILABLE MOTORS: $\frac{1}{2}$ or $\frac{1}{3}$ HP; constant speed, continuous duty.



Get all the details!
Send for descriptive
bulletin today!

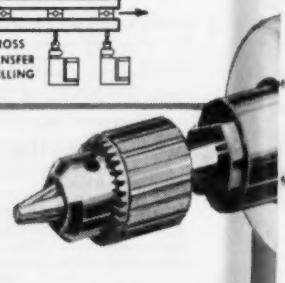
Mount the Dumore
Automatic Drill Units
to fit your needs



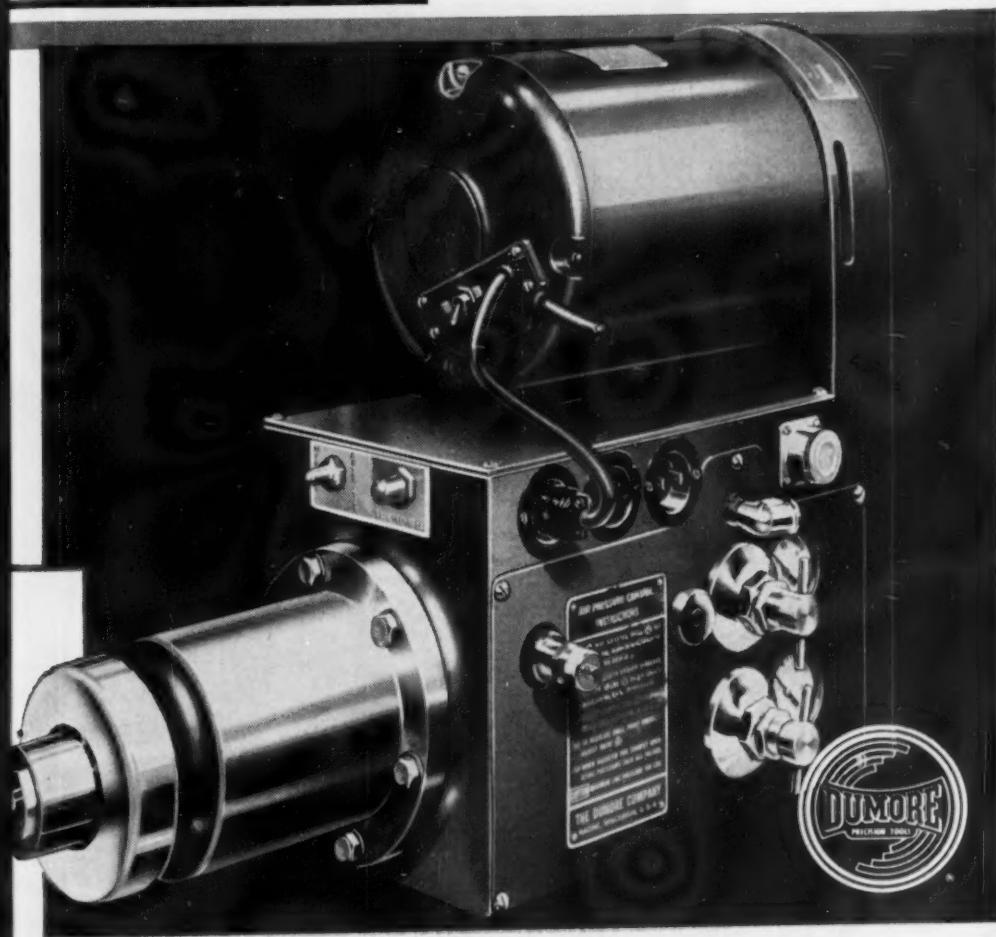
DUMORE

PRECISION TOOLS

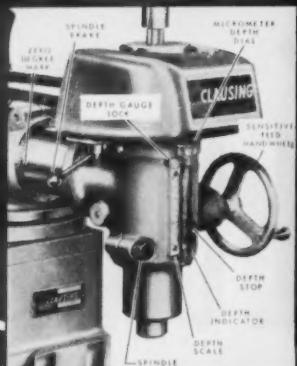
RACINE, WIS.



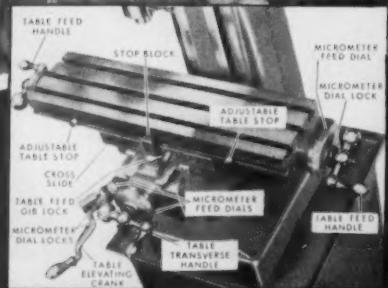
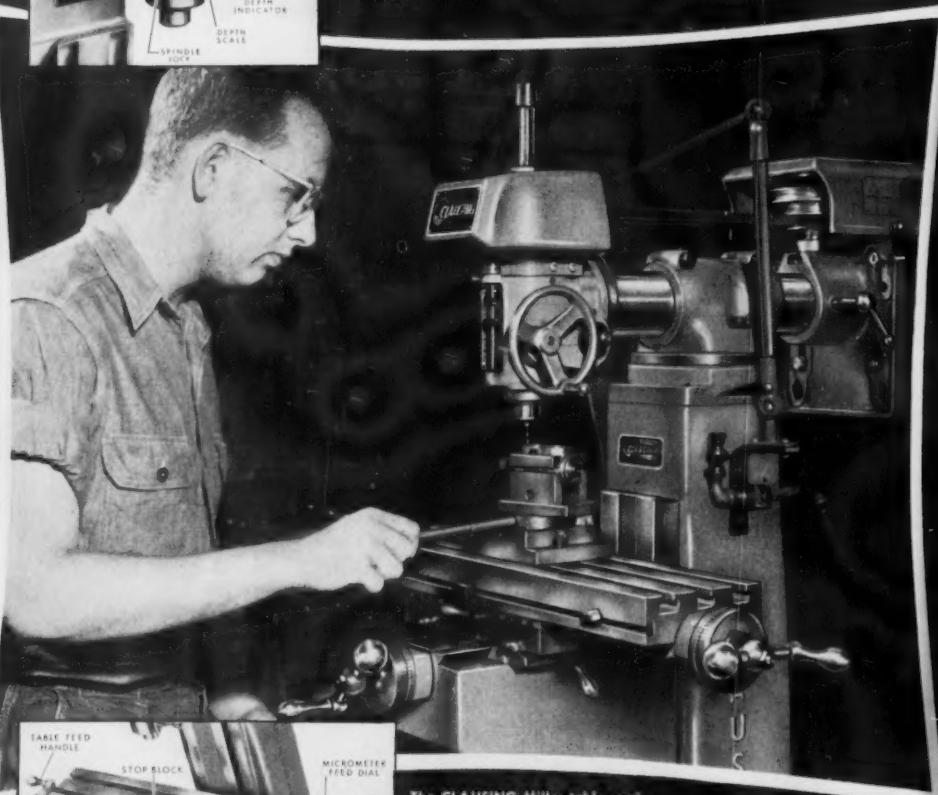
sensational
MATIC DRILL UNIT



WHY

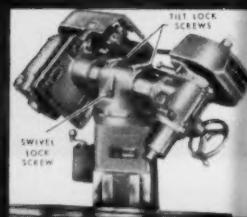


The Heart of the Clausing Mill is its rigid, high precision spindle head. It has 7 ball bearings — spindle is chrome nickel steel, hardened and ground — quill, ground and hard chrome plated, has honed bearing seats — overarm is an electric furnace casting, with $\frac{3}{4}$ " thick walls precision ground. The Clausing is a "sensitive" machine you'll appreciate on those difficult jobs.



The CLAUSING Milling table, saddle and knee position smoothly and accurately. Table surfaces and all dovetail ways are precision ground . . . ways have gibbs. Feed screws have ground threads, turn on ball bearings.

The spindle head can be swiveled in a vertical plane and set at any angle, and turret rotated in a horizontal plane making it possible to mill at all angles with one setup. Quill has micrometer depth control stop and two feeds, lever and hand wheel.



the new CLAUSING VERTICAL MILLERS are the busiest machines at

The new CLAUSING VERTICAL MILLER is a precision machine tool designed for jig, die and fixture making . . . pattern, experimental and tool-room . . . and general production milling. Many new, exclusive features give it greater versatility and ease of set-up and operation than have ever been available in a miller at or near its price.

And . . . it is extremely accurate! Every CLAUSING MILLER must pass rigid tolerance tests — such as:

- 1 Top of table perpendicular to column ways, both directions, within .0005" in 8" travel.
- 2 Table top, front to back, square with column ways 0 to .001".
- 3 Table, parallel to turret within .001".
- 4 Spindle square with table, front to rear, within .001" T.I.T. in 5" circle.
- 5 Spindle taper (internal) run out within .0002" at spindle nose.
- 6 Table T-slots parallel to table dovetail ways within .0005" in 8" longitudinal travel.

You'll be as enthusiastic as P-a-l Engineering with the performance of the new Clausing . . . and you'll be pleased, too, with its low cost and many operating economies. See it today at your CLAUSING dealer's!

**MILLS, DRILLS, BORES,
REAMS & SHAPES . . .
AT ALL ANGLES . . .
WITH ONE WORK SETUP!**

P-a-l Engineering Inc.

1915-2023 North Pitcher Street
Kalamazoo, Michigan

Gentlemen:

We have recently purchased our fourth Clausing Vertical Miller and find it measures up to the finest machine standards.

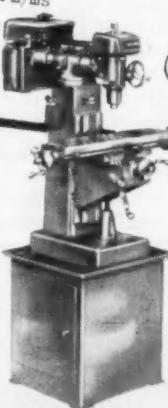
For standard precision, milling, drilling, boring, and location operations within capacity, it has no equal. We find the Clausing Vertical Mill the most versatile machine in our shop, and equal in performance and accuracy to several makes of higher-priced mills of which we have available.

The Clausing Vertical Mills are the busiest machines in our shop due to the variety of operations that can be performed and completed. For speed, convenience, accuracy and higher production at lower cost, it has no equal.

The Clausing Vertical Mill is the preference among our men for all milling machine work in its capacity because it is easier to work on, change set-ups, and it is consistently accurate.

PL/MS

Sincerely yours,
Paul Lebeda
Paul Lebeda



CONDENSED SPECIFICATIONS

Size of Table	6" x 24"
Longitudinal Table Travel	15"
Transverse Table Travel	5"
Vertical Table Travel	11 1/2"
Maximum Distance Spindle to Table	11 1/2"
Maximum Distance Spindle to Column	8 1/2"
Quill Travel	3"
Spindle Speeds: Six, 180 to 3250 R.P.M. — No. 7 Brown and Sharpe or No. 2 Morse Taper, Spindle Optional	— Operates from 1/2 or 3/4 HP, 1725 R.P.M. Motor.

WRITE FOR ILLUSTRATED LITERATURE TODAY!

QUALITY MACHINE TOOLS SINCE 1911

CLAUSING DIVISION

11-110 N. PITCHER ST.,

CLAUSING HEAVY-DUTY PRECISION LATHES, HEAVY-DUTY DRILL PRESSES

Atlas Press Company

KALAMAZOO, MICHIGAN



A new twist in milling cutter design...

removes metal 3 to 10 times faster!
gives finishes of 20 rms and better!



Proof of "Helicarb" efficiency!
A 3" "Helicarb" straight shank end mill on a 50 h.p. mill removed $6\frac{1}{2}$ cubic inches of 2340 nickel alloy steel (Rockwell C28) per minute! Spindle speed 416 r.p.m.; table speed 19" per minute; cut depth 1-5/32".

Ask your authorized
industrial distributor
for prices and sizes.



Slab
Mills



Shell-End Mills



End Mills

HELICAL CARBIDE MILLING CUTTERS

Sonnet Tool and Mfg. Co., 576 No. Prairie Avenue, Hawthorne, California

The new Sonnet Helicarb Milling Cutters combine the edge hardness of one-piece carbide tips with the proven principle of a true helix flute design. Result? A rugged, heavy duty cutter unmatched for stock removal and efficiency!

The constant included cutting angle of the "Helicarb" cutter distributes the cutting load uniformly over the full length of the cutting edge. Under proper conditions, this unique shearing cutting action reduces impact and gives 3 to 10 times greater production than possible with helical flute high speed steel, or straight tooth, carbide-tipped cutters. Uniform chip load and proper chip flow result in longer cutter and carbide life, less chatter, minimum chip recutting and smoother finishes—20 rms and better on actual production jobs!

HELICARB

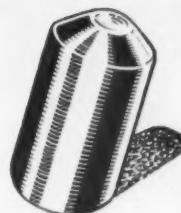


SENTRY Furnaces *eliminate decarburization* **at Chicago Rivet**

Two Sentry Furnaces (part of a 3-furnace installation) at the Chicago Rivet and Machine Co., Bellwood, Illinois, provide trouble-free service unequalled by other furnaces.

Only the Sentry Diamond Block Atmosphere gives them the scale-free and decarburization-free heat treatment of hammers and tools required in the production of rivets and resale and replacement parts.

Visit us at Booth 445
National Metal Exposition—Chicago



Header hammers must be completely free of decarburization.



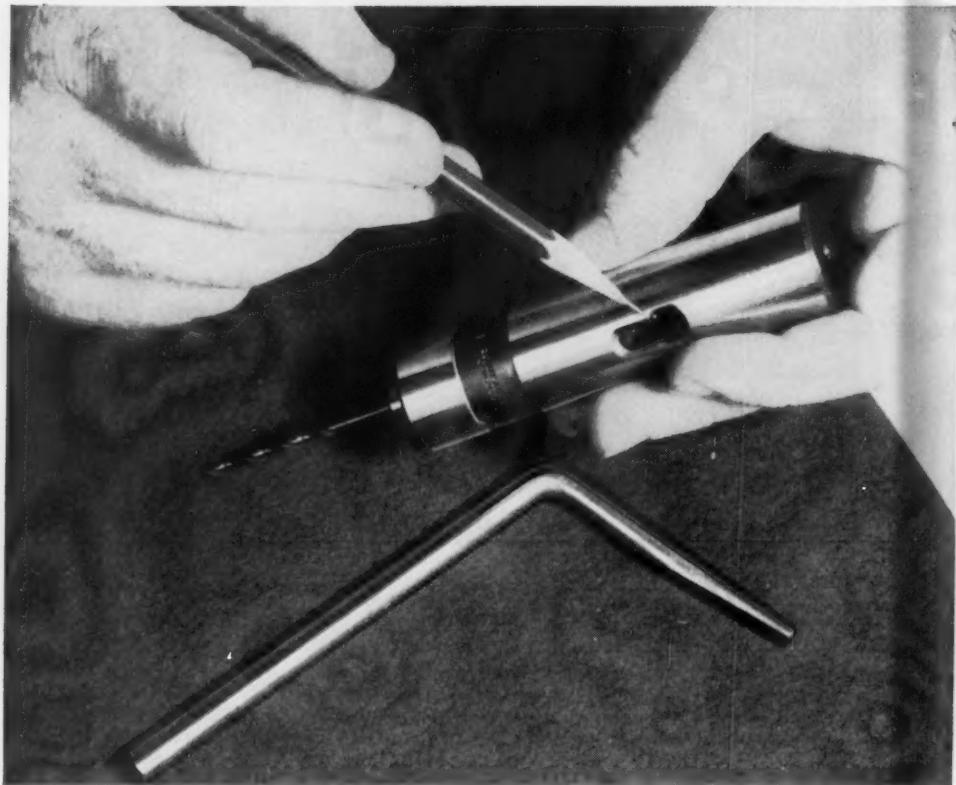
Request Catalog C-15

Tells the full story of Sentry Furnaces and The Sentry Diamond Block Method.

Sentry ELECTRIC FURNACES
TRADEMARK
THE SENTRY CO. • FOXBORO • MASS.

New Scully-Jones

simplifies and speeds tool changes



**Prevents damage to bearings and spindles
often caused by hammering!**

**SCULLY
JONES**

Here's another reason why it pays to standardize on Scully-Jones "Precision Holding" Tools. This new tool ejection method (now standard on Scully-Jones Tools shown on right-hand page) offers many advantages over conventional methods of "drifting" tools from a holder or spindle.

Damage to machine bearings and spindles may now be eliminated because Scully-Jones "Keyhole" Tool Ejectors literally "push" tools

and adapters out of the spindle *without pounding*. There are no axial stresses or shocking blows to break tools and knock spindles out of alignment.

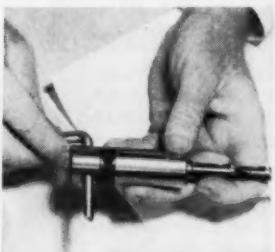
Ejection is faster and easier, too. It frees one hand to hold the tool being ejected. Stationary mounted in presetting gage plates, "Keyhole" Tool Ejectors are ideal for making tool changes with a minimum of time and effort. So, look for these new "Keyhole" slots in the next Scully-Jones tools you buy. Write for details in Bulletin No. 14-50.

"Keyhole" Tool Ejector

... safeguards machine accuracy!



Cam-shaped tip of the "Keyhole" Ejector fits in rounded top portion of "Keyhole" drift slot. Operator merely turns the handle slightly—the cam on the ejector creates a smooth, powerful "push" directly behind the tool.



Ejector is quickly and easily inserted and removed from the "Keyhole" slot. Ejection is foolproof as the slot accommodates conventional drift pins should a tool or adapter become "jammed" in a holder or machine spindle.

"Keyhole" slots are the new "standard" on these Scully-Jones "Precision Holding" Tools!

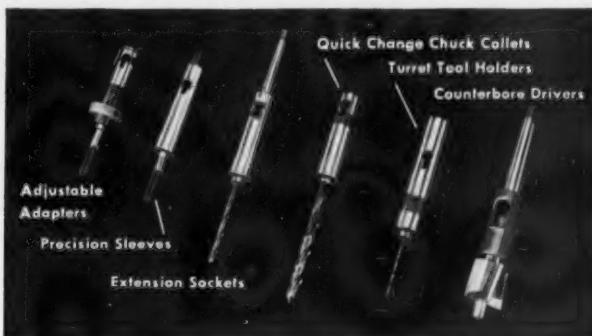
Quick-Lock Adjustable Adapters—With the exclusive Scully-Jones "Keyhole" drift slot, pilot nose, and Quick-Lock nut, you can change tools and make accurate depth adjustments faster and easier. Write for Bulletin 6-50.

Precision Sleeves and Sockets—Select from a complete line of hardened and ground precision sleeves to reduce any ASA or Morse taper hole to smaller taper. Short, medium, and long series extension sockets. Style 100 "Use-Em-Up" sleeves also available. Bulletin 7-50.

align throughout a lifetime of service. Short, sleeve, and extension types available to meet most needs. Write for Bulletin 7-50.

Quick Change Chucks and Collets—Give you multiple-spindle range on single-spindle and gang-type drilling, reaming, and tapping operations. Tool and collet are quickly and easily locked in the chuck without stopping the machine spindle. Have variety of applications. Write for Bulletin No. 3-50.

Counterbore Drivers—Complete range of drivers for



Turret Tool Holders—They're hardened and ground to assure perfect fit in the turret and withstand rough usage without nicking and burring. Easy to insert and

Scully-Jones Solid High-Speed Steel and Carbide-Tipped Counterbore Cutters, Countersinks, and Core Drills. Write for Bulletin 5-50.

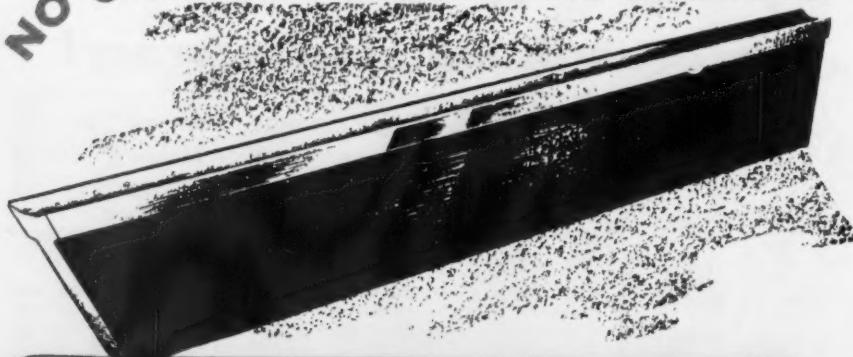
Stocked by Scully-Jones Distributors in all principal cities

SCULLY-JONES

"Precision Holding" for holding precision

SCULLY-JONES AND COMPANY, 1909 S. ROCKWELL ST., CHICAGO 8, ILL.

NO OTHER CUT-OFF BLADE LIKE THIS!



None can do what **EMPIRE'S**
Luers Cutting-off Blade

will do

Empire Tool Co. is the LEADER in cut-off blade developments—backed by twenty years' experience in cut-off blade manufacture.

Cut-off blades are tools subject to conditions different from those of other tools and will perform most efficiently only when specialists' recommendations are followed.

Available from stock are blades of four types of high speed steels developed to meet the demands of cut-off operations. And on short notice you can get blades of cast alloys and tungsten carbide.

Made under license issued by John Milton Luers Patents, Inc.

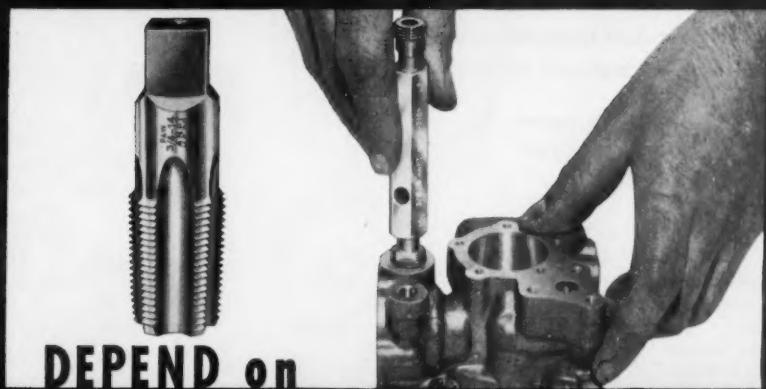
Made in U.S.A.

EMPIRE
TOOL COMPANY

8776 GRINNELL AVE.

DETROIT 13, MICHIGAN

BE SURE you'll meet the **SPECS**
FOR ACCURATE **ANPT** THREADS



DEPEND on
PRATT & WHITNEY
ANPT TAPS AND GAGES

Here is a P&W Team that will help you produce threads that meet the rigid Military Specification MIL-7105.

P&W ANPT TAPS are correctly designed and carefully manufactured; width of crest and root flats are closely controlled. They will deliver long wear life and consistently produce threads to ANPT standards.

P&W ANPT GAGES check taper, diameter and form of the thread . . . tell at a glance if internal or external threads meet the specifications and will assemble correctly. Four different types are supplied; all are approved by the Army, Navy and Air Force as meeting their inspection requirements.

SEND THIS
COUPON
FOR
COMPLETE
INFORMATION



PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY

25 Charter Oak Blvd., West Hartford 1, Connecticut
Please send my free copy of P&W ANPT Gage Circular
No. 549-1.

NAME _____

POSITION _____

COMPANY _____

CO. ADDRESS _____

CITY _____ ZONE _____ STATE _____

MACHINE TOOLS • CUTTING TOOLS • GAGES

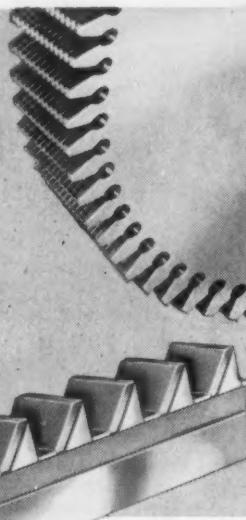
Whatever kind of gears you make...

Whatever way you make them

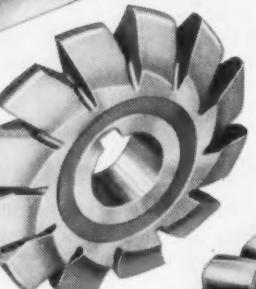
National Tool Co.

can supply the right type cutting tool
because we make all types

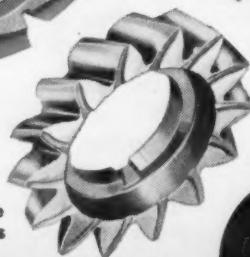
National Tool Co., with 50 years experience in the manufacture of special cutting tools, makes all varieties of gear cutting tools for all types of spur, helical and worm gears—as well as for sprockets and splines. Whatever your gear requirements—large or small—National engineers can help you decide the most efficient method of producing them.



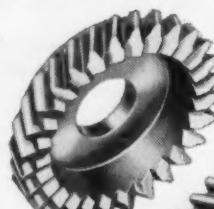
Rack Type Gear Shaper Cutters



Involute
Gear Cutters



Herringbone
Gear Cutters



Gear Shaper
Cutters



Master Gears

National
TOOL CO.
Cleveland 2, Ohio

Representatives in major industrial centers



Gear Shaving Cutters

Hobs



Complete Set

ANTON MAGNETIC PARALLELS & V BLOCKS

Anton Magnetic Parallels and V Blocks have no pins, rivets or any other mechanical means of holding laminations together, therefore guaranteeing maximum magnetic flux line penetration and also guaranteeing that the laminations will not shift or fall apart.

Laminations spaced either 1/16th Brass & 1/16th Iron or 1/16th Iron & 1/64th Brass.

Included sizes are as follows:

MAGNETIC V BLOCKS

	HEIGHT	WIDTH	LENGTH
1-Pair	1 $\frac{1}{8}$ "	X	2 $\frac{1}{4}$ " X 1 $\frac{1}{8}$ "
1-Pair	2 $\frac{1}{8}$ "	X	3" X 2 $\frac{1}{4}$ "
1-Pair	4 $\frac{3}{8}$ "	X	3" X 2 $\frac{1}{4}$ "

MAGNETIC PARALLELS

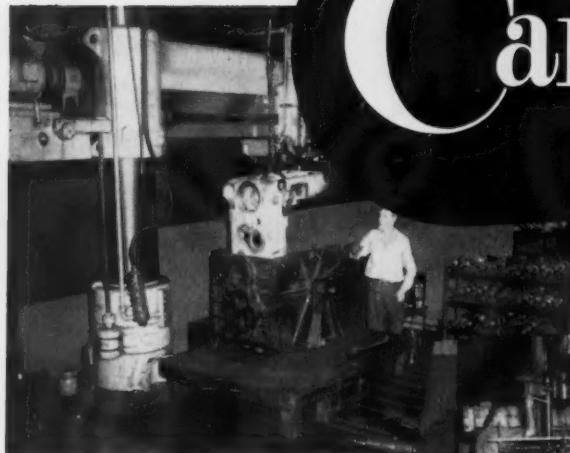
	HEIGHT	WIDTH	LENGTH
2-Pair	6"	X	1 $\frac{1}{4}$ " X 1 $\frac{1}{2}$ "
1-Pair	6"	X	1 $\frac{1}{4}$ " X 1 $\frac{1}{2}$ "
1-Pair	6"	X	1 $\frac{1}{2}$ " X 7 $\frac{1}{8}$ "
1-Pair	6"	X	1 $\frac{1}{2}$ " X 1 $\frac{1}{2}$ "
1-Pair	6"	X	3 $\frac{1}{4}$ " X 1 $\frac{1}{4}$ "
1-Pair	9"	X	3" X 2 $\frac{1}{4}$ "

Complete price including wooden carrying and storage case \$247.98 F.O.B. Anton Machine Works.

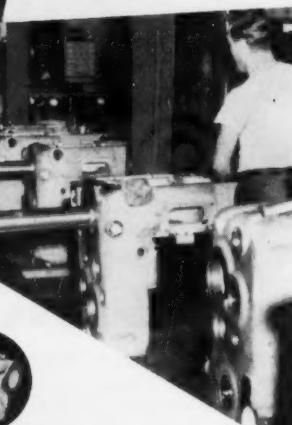
Anton Machine Works

1226 FLUSHING AVENUE • BROOKLYN 37, NEW YORK

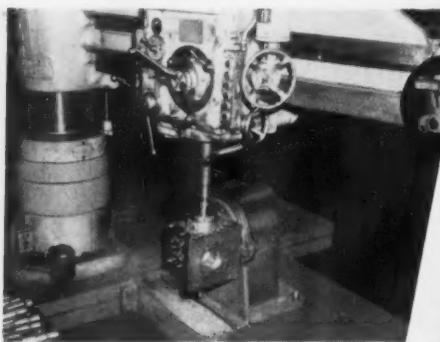
Carlton:



► Carlton's radial drill department (left) set up to drill and bore Carlton radial drill heads.

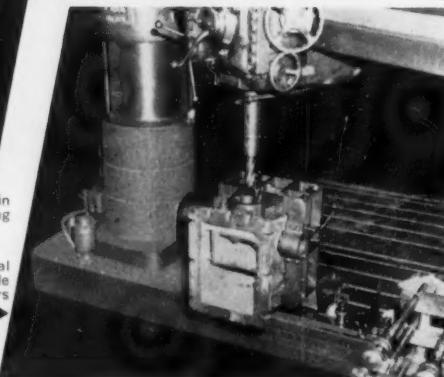


Carlton head assembly (right) is fast, efficient, due to absolute interchangeability of parts produced by Carlton radial drills with Carlton-engineered tooling. Total time saving: 7 hours per piece! Tolerance: .0003".



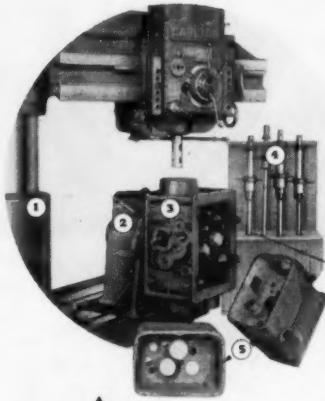
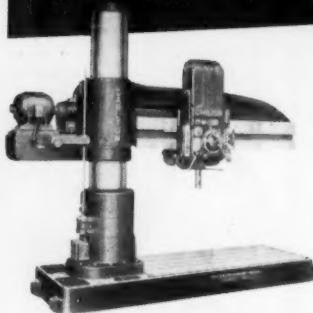
▲ Power head clamp body: Jig designed to machine six sides in two operations. Produced 25 to 50 pieces per lot. Time saving 90 minutes per piece. Tolerance: .0003".

Pedestal for Uni-tilt Table: Proper tooling of this Carlton radial drill produced interchangeability of parts, saved considerable assembly time. Time saved in Carlton drilling set-up: 2 hours per piece. Tolerance: .0003".



RADIAL DRILLS . . .

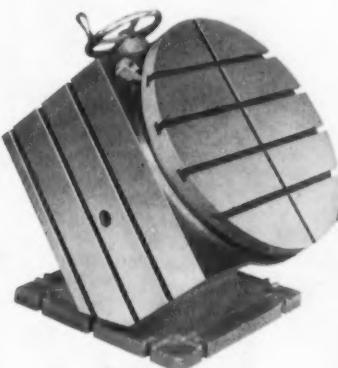
plus Carlton engineered tooling produce the accuracy, uniformity and interchangeability of parts indispensable for production line assembly



Transmission body casting: Present running and set-up time: 5.25 hours. Previously: 7 hours. The set-up:
(1) Carlton 3-A radial drill,
(2) master trunnion,
(3) jig,
(4) boring bars,
(5) transmission body casting. 25% savings effected by eliminating boring operation previously done in a horizontal plane.

More perfect parts speed up production line assembly. Carlton radial drills, properly toolled, give you perfect hole drilling—and frequently effect substantial savings by eliminating unnecessary operations.

Carlton engineers will be glad to work with your engineers in recommending the best Carlton radial drill and the most efficient tooling for your requirements. No obligation, naturally. Why not write us today?



Universal Table with 32" round top. Carlton engineered and produced. Anti-friction mounted for easy operation. Handy table for drilling compound angles which heretofore required more complicated set-ups. Permits drilling on five sides of a workpiece without changing set-up. Available for use on any Carlton radial drill.

Carlton

THE CARLTON MACHINE TOOL CO.
Cincinnati 25, Ohio, U. S. A.

eliminate the guesswork in selecting tool steels

tool steels

Thousands of metal working people are using the Crucible Tool Steel Selector to determine exactly which type of steel they need. This handy selector covers 22 tool steels which fit 98% of all tool steel applications.

HERE'S AN EXAMPLE:

Application — Deep drawing die for steel

Major Class — Metal Forming — Cold

Sub-Group — Special Purpose

Tool Characteristics — Wear Resistance

Tool Steel — Aircat 150

A turn of the dial does it! And you're sure you're right





The selector is unique because it starts with the ultimate use of the steel. It breaks down all tool steel applications into six major classifications, under which the different grades of steel available for certain specific requirements are indicated in legible cutouts. Heat treatment and machinability data are also included for each grade.

A flip of the dial will give you the answer, and almost just as quickly you can get the steel you select. For each type of steel shown on the selector is in stock in Crucible warehouses, conveniently located throughout the country.

To get your Selector merely fill in the coupon and mail. There is no obligation whatsoever.

1/3 actual size, Selector is in 3 colors

Crucible Steel Company of America

Dept. MS, Oliver Building
Pittsburgh 22, Pa.

Name _____
Company _____ Title _____
Address _____ City _____ State _____

CRUCIBLE

54 years of *Fine* steelmaking

TOOL STEELS

first name in special purpose steels

CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.



MULTIPLE DRILL SPINDLES

for LOW, MEDIUM AND HIGH PRODUCTION



for
precision
and fast
set up!



Quality

MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

for complete details
write, phone, or wire

SEIBERT & SONS INC.
CHENOA, ILLINOIS

Engineers choose SEIBERT for precision and fast set up. SEIBERT spindles last indefinitely while they maintain accuracy. A special engineering department is ready to serve you, should it become necessary to deviate from our drilling and tapping standards.

FOOTBURT

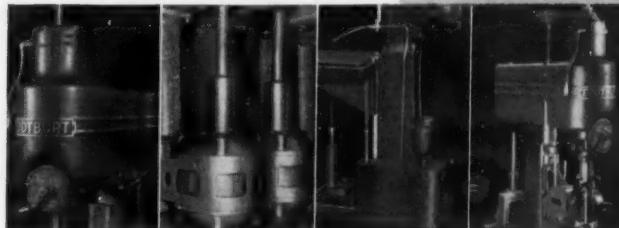
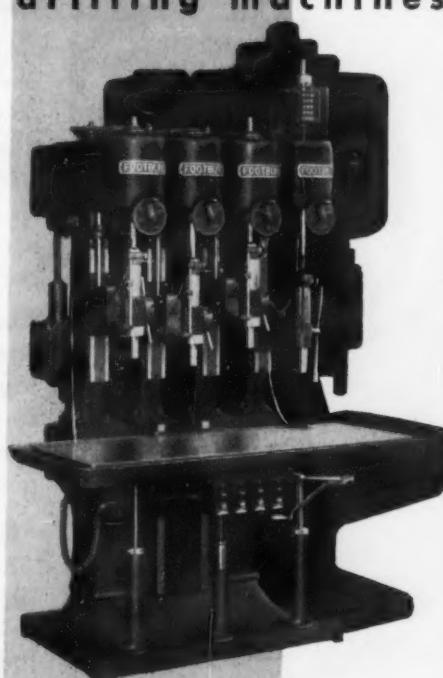
sensitive drilling machines

A FULL RANGE
DRILLING MACHINE
ENGINEERED FOR
PRODUCTION

Built carefully to provide the required accuracy for fine tool room work, Footburt Sensitives are designed with the weight and stability to maintain close tolerances on day after day production work. The correct speed for a wide range of drilling, reaming, and counter-boring operations is instantly available. Write for full information on this great line of Sensitive Drilling Machines. Built in 1, 2, 3, 4, 6 Spindle Models.

THE FOOTE-BURT COMPANY
Cleveland 8, Ohio

Detroit Office: General Motors Building

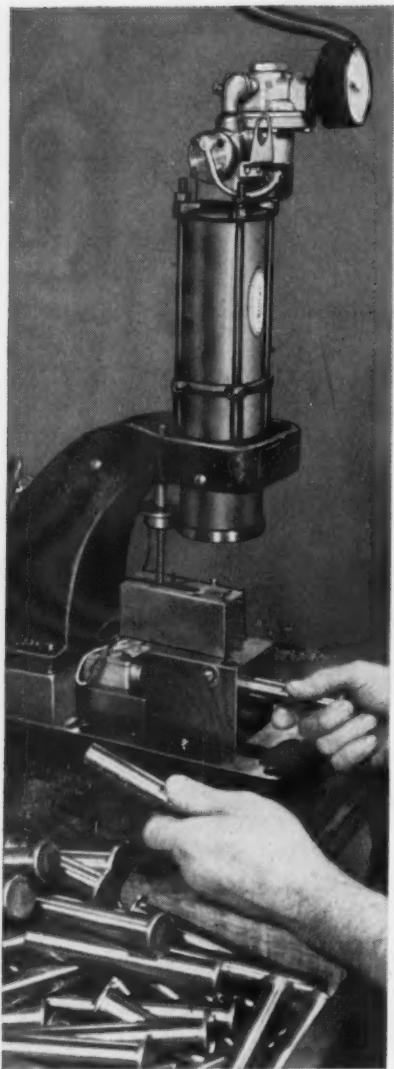


• No. 2 Machine with Back Gear • 12" Overhang •
3/8" Drilling Capacity in Steel • Optional Speed
Ranges • 185 to 2300
RPM • 280 to 3450 RPM
• Vertical Motor Drive with
Standard Single Speed
Motor • Power Feed As-
sembly • Tapping Attach-
ment • Coolant Outfit.

*engineered
for
production*

FOOTBURT

MACHINE TOOLS



The Super-Speed Air Motor mounted on a Bellows Air Motor Arbor Stand at Carmel Screw Products Co., Carmel, Ind. Inserting the part in the fixture trips the micro-switch to advance the piston, stamping the part number in the steel rod.

SMALL AIR CYLINDER Packs Powerful Punch

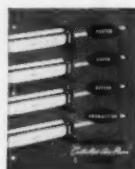
At 100 lbs. air line pressure this Super-Speed 2½" bore Bellows Air Motor develops enough force to punch a ½" diameter hole through $\frac{1}{16}$ " thick mild steel. The speed of the piston rod is six to ten times the maximum speed of a standard air cylinder of the same bore.

This extra power makes the Super-Speed suited for a wide range of staking, riveting, forming, swedging, stamping, marking and punching operations which normally require bulky, heavy duty press equipment.

BUILT-IN VALVE AND CONTROLS

The Super-Speed Bellows Air Motor comes complete with either a built-in manually operated valve or the Bellows Electroaire electrically-controlled valve, with or without safety controls. Standard stroke length: 2", 2½", 4", 6", 9" and 12".

To learn more about the many ways you can use the wide range of Bellows "Controlled-Air-Power" Devices write for this free book. Ask for Bulletin CL-30. Dept. MMS1154.



**The
Bellows Co.**
Akron 9, Ohio

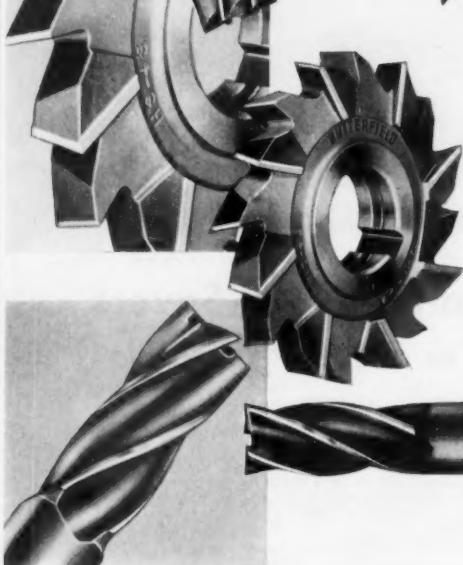
1381

Announcing

MILLING CUTTERS and END MILLS

by Butterfield

With the addition of Milling Cutters and End Mills, Butterfield now offers a full line of metal cutting tools. Milling Cutters and End Mills are made to the same exacting standards of dependability and extra performance which mark Butterfield's Taps, Dies, Drills, Reamers, Counterbores, and Screw Plates.



BUTTERFIELD

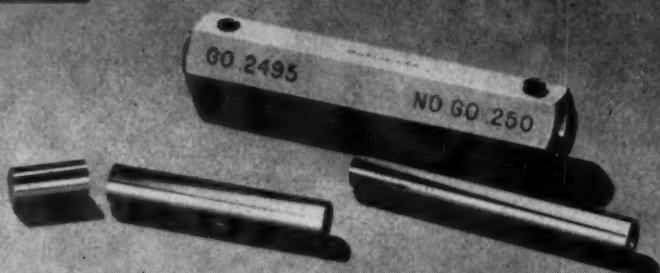
UNION TWIST DRILL COMPANY
BUTTERFIELD DIVISION
DERBY LINE, VERMONT, U.S.A.

TAPS · DIES · DRILLS · REAMERS · COUNTERBORES · SCREW PLATES · MILLING CUTTERS · END MILLS

FOR BETTER SERVICE
CALL YOUR
BUTTERFIELD
DISTRIBUTOR



WIRE TYPE PLUG GAGES



VASTLY LONGER-LIVED and Money-Savers because they're "Cut-off-Able" as well as "Reversible"

As a Van Keuren agent put it, "They're not only reversible, they're cut-off-able". And that means when you buy Van Keuren Wire Type Plug Gages, the sizes below $\frac{3}{8}$ " may be cut off when ends become worn and as many as from five to ten gages made available from the $1\frac{1}{8}$ " and 2" long units. It is not only economical and practical to use Van Keuren Gages but it is a very simple operation to cut off the ends by following instructions furnished on request. The illustration above shows clearly the cut-off and reversible features.

VK Wire Type Gages are available in ZZ to XX accuracies in sizes from .001" to 1.000". They are furnished in alloy tool steel, high speed steel, chromium plate or tungsten carbide. Whatever the gaging job, the extra length provided in VK units will save you money. It will also pay you to take advantage of VK deliveries. In many cases we can ship your requirements from stock.

VK Wire Type Plug Gages are fully described in Catalog & Hand Book No. 35, available on request by writing to: The Van Keuren Co., 175 Waltham St., Watertown, Mass.



35th YEAR

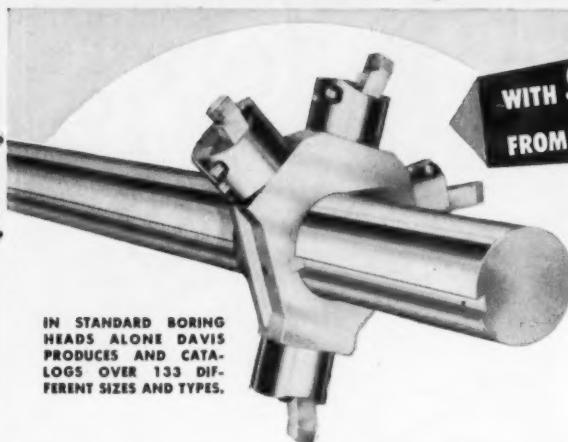
THE *Van Keuren* co.

175 WALTHAM STREET, WATERTOWN, MASS.

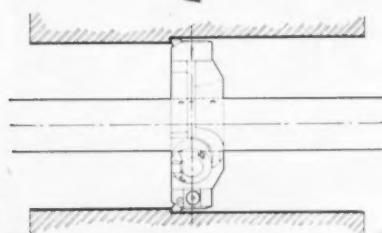
Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboley Cemented Carbide Plug Gages • Carboley Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages



Let DAVIS cut your Boring Costs 2 ways



WITH Standard Tooling ITEMS
FROM INDUSTRY'S MOST COMPLETE LINE



WITH Job-Engineered SPECIALS
FROM INDUSTRY'S FOREMOST DESIGNERS

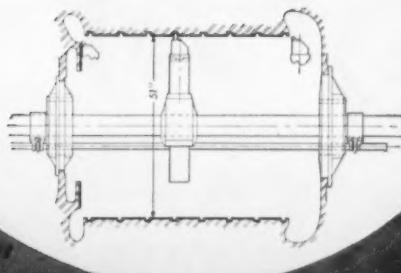
Where work is beyond the scope of standard tools or where efficiency can be improved or costs reduced by combined operations, special fixturing, etc., the specialists in Davis Engineered Tooling Service will work with you in developing tools for even the most complex application. Consult your local Davis field engineer or send us complete work details for impartial recommendations.

DAVIS
BORING TOOL DIVISION

AMERICAN & LONDON MANUFACTURING COMPANY
Fond du Lac, Wisconsin

Every boring job in your shop...regardless of range, material or complexity...can be done faster, cheaper and with greater precision, when you make Davis your tooling headquarters. That's because only Davis has both the complete line and broad machining experience to supply or design exactly the right tool for your work.

Davis tooling specialists help you immeasurably in selecting the right tool from industry's broadest standard line. Their unrivaled background of practical shop experience assures recommendations that exactly meet all your requirements for tolerances, finish, speeds, feeds and maximum tool life at minimum cost.



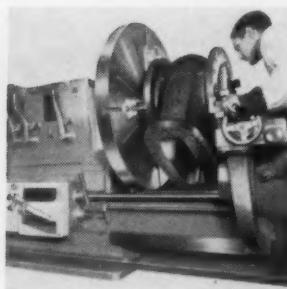
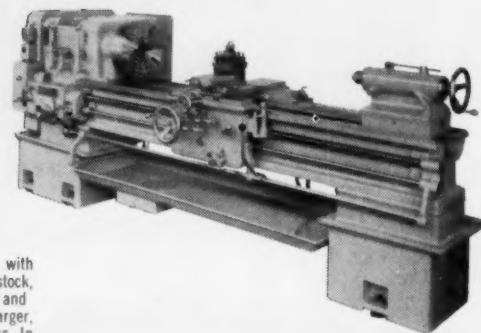
**POWER
PRECISION
PERFORMANCE**



Engine Lathes

16", 20", 25", 27", 32", 36" sizes

Now heavier, more substantial, with shaved and hardened gears in headstock, hardened gears in quick change box and apron. Timken anti-friction bearings, larger, heavier aprons, carriages and tailstocks. In short, more lathe for your money!



Extension Bed Gap Lathes

20"/40" and 28"/50" sizes

28"/50" Nebel 'G' series shown, swings 52" through the gap, 29" over the ways. Shaved and hardened gears and Timken bearings throughout headstock. Takes 15- or 20-hp motor. Also made in 20"/40" 'AG' series. Both series now heavier, more accurate, faster and more powerful.

*For complete information on the best
Nebel lathe for your requirements
address*

THE NEBEL MACHINE TOOL CO.

3409 Central Parkway

• Cincinnati 25, Ohio

Each year more and more firms are discovering **COMTORPLUG**



"PACKAGED PRECISION"

NEEDS NO WIRES,
HOSE, ELECTRONIC
GEAR OR
HEAVY BASE

REQUEST NEW BULLETIN NO. 48

COMTOR CO. 64 FARWELL ST., WALTHAM 54, MASS.

Parmed A Company

3187 North 10th Street

Phoenix, Arizona 85008

Phone: 2-17890

Gerald B. Doff & Company

10101 E. Cactus Road

Phoenix, Arizona 85020

Phone: 2-17890

F. D. Montezuma Co.

1001 E. 10th Street

Phoenix, Arizona 85004

Phone: 2-17890

Pector & Marine Co., Inc.

2077 Elmwood Street

Bethel, Maine

Phone: 2-17890

Harold E. Sandberg

Offices: Boston, New York

Baltimore, Philadelphia, Chicago, St. Louis

Phone: 2-17890

Conant Brush Company

Offices: Boston, New York

Baltimore, Philadelphia, Chicago, St. Louis

Phone: 2-17890

Walter K. Ott

300 Abington Street

Dayton 5, Ohio

Phone: 2-17890

Envirotron Testor of Canada, Ltd.

1232 Euclid Avenue West

Toronto, Ontario

Phone: 2-17890

Clyburn W. Cook

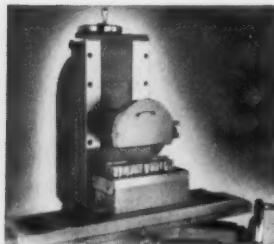
6100 East Olympic Blvd.

Los Angeles 27, California

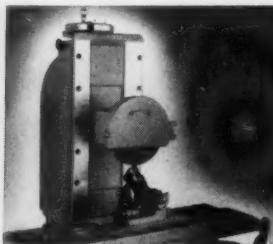


Costs Less
TO OWN, OPERATE, MAINTAIN
Does More Jobs
ACCURATELY, LONGER...
EXCEL No. 7 HAND FEED SURFACE GRINDER

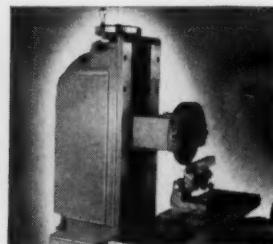
To replace your old equipment or to relieve your large grinders of small production jobs use the Excel No. 7. It's ruggedly constructed to do a variety of precision production and tool room jobs — grinding tools, dies, chip breakers, thread chasers — Working surface of table 5 $\frac{1}{2}$ " x 10 $\frac{1}{2}$ ".



Grinding steel blocks in production while held on magnetic chuck. Shoulder is also ground with side of grinding wheel square with flat ground surface. Gives precision at a small investment.



Grinding chamfer on thread chasers. Angles established by use of Covel Style A Vise. Accurate location of chaser relative to grinding wheel lets operator hold consistent dimensions for each chaser.



Set-up for grinding chip breakers in single point tools. Covel Style "A" Vise mounts directly on table and establishes proper angles. Diamond wheel may be used for carbide tools.

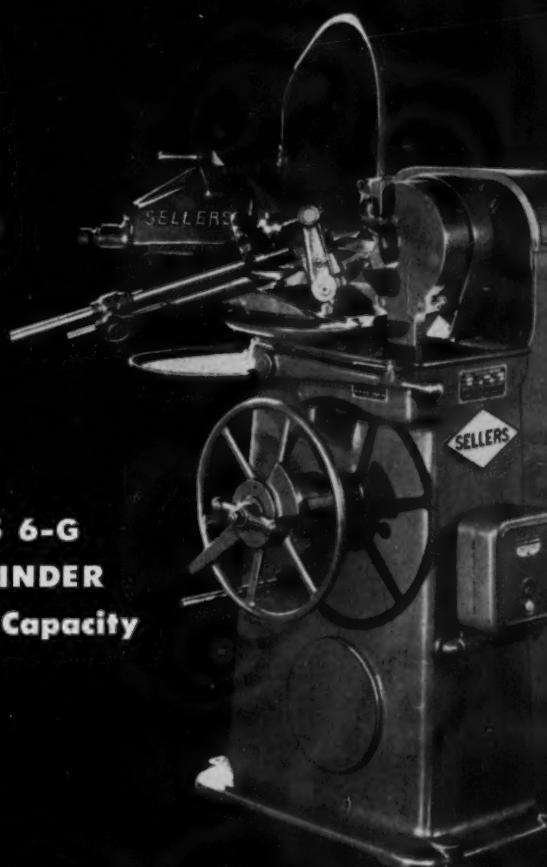
Complete Specifications and Features
in Bulletin E-114—Write for it today!

CVEL PRECISION GRINDERS
BENTON HARBOR, MICHIGAN

*Almost every new twist
drill that comes into
your shop has been ground
on a Sellers Drill Grinder!*



The
SELLERS 6-G
DRILL GRINDER
5/16" to 3" Capacity



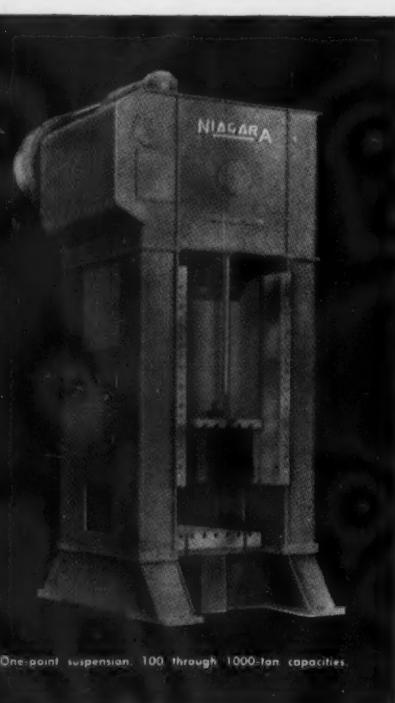
CONSOLIDATED
MACHINE TOOL CORPORATION

WHOLLY OWNED SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED
ROCHESTER, NEW YORK

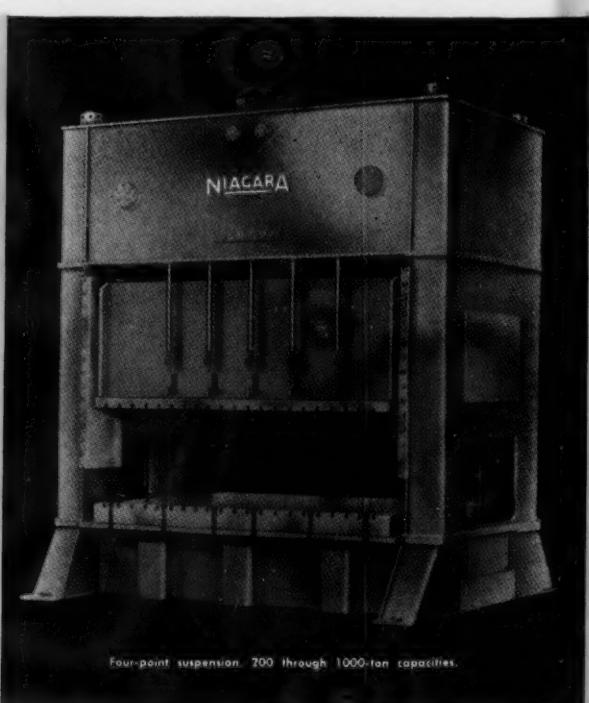
NEW!

MASTERFULLY ENGINEERED

excels in large, heavy tonnage



One-point suspension, 100 through 1000-ton capacities.



Four-point suspension, 200 through 1000-ton capacities.

► ECCENTRIC DRIVE DELIVERS GREATER TORQUE WITH LESS DEFLECTION

In Niagara Series SE Presses, the eccentric is an integral part of the main gear (or gears) which rotates on a stationary pin rigidly supported in the crown, close to the point at which the pressure is exerted. Serving merely as a pivot, the pin carries no torsional load and relatively little bending load. Net result: Niagara's eccentric gear design can deliver greater torque with less deflection than other types of construction.

► RUGGED, RIGID, ALL-STEEL FRAMES PROVIDE GREATER ACCURACY, LONGER DIE LIFE

Frames are rugged, all-steel, four-piece, tie rod construction of great strength and rigidity, stress relieved in a furnace and thoroughly grit-blasted before machining. Each frame size has been scientifically tested for deflection to meet Niagara standards—the most exacting in the industry.

► LOW INERTIA, PNEUMATIC FRICTION CLUTCH RUNS COOLER, WEARS LONGER

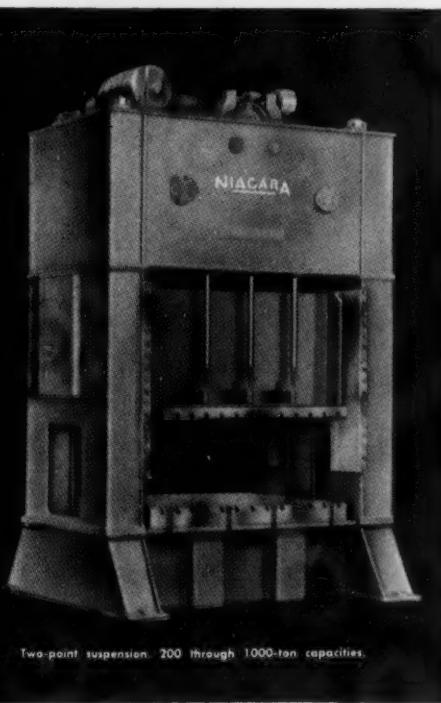
Most of the weight of the Niagara clutch continues to rotate with the flywheel. Only the drive shaft and driving plate start and stop with each cycle. The resulting low weight and inertia of the parts, picked up during clutch engagement, greatly reduce heat and wear. As the clutch rotates, it acts as a centrifugal blower, providing positive ventilation. Plates automatically compensate for normal wear, with no adjustment necessary.

► MODERN, STREAMLINED DESIGN EMPHASIZES COMPACTNESS

The entire driving assembly is neatly housed in the crown. There is no exposed, overhanging flywheel, clutch, brake, shaft nor motor in the rear of the press to obstruct crane service, block light, throw grease or consume space unnecessarily.

LINE OF METALWORKING CHAMPIONS

drawing, punching and blanking work



Two-point suspension. 200 through 1000-ton capacities.

DELUXE OPERATING CONTROLS INSURE UTMOST SAFETY, EFFICIENCY AND CONVENIENCE

Compactly and conveniently arranged on a master panel, Niagara controls are instantly accessible for fingertip direction of every press operation: starting, slide adjusting, jogging, die tryouts, running and stopping. The latest safety devices provide maximum protection for die setter, operator and the press itself. Nothing has been overlooked. Trial runs assure that all controls are in proper working order before each Niagara press leaves the plant.

Without equal in engineering design, performance and stamina, this great new line of Niagara Straight Side Eccentric Geared Presses is every inch a champion. It is an outstanding example of the advanced thinking that has made Niagara the pace-setter among builders of metal working machines for 75 years.

Masterfully engineered and ruggedly constructed to handle a tremendous variety of work, the new Niagara SE Series is the most practical and dependable press line built for:

- Work requiring large die areas.
- Heavy tonnage demands.
- Long stroke, deep drawing jobs where work is engaged high up on the stroke.
- Bottom-of-stroke blanking and punching.

THE COMPLETE STORY IS READY FOR YOU NOW!

Make a feature-by-feature appraisal of what these great new presses can do for you. Write for newly published, illustrated Bulletin 66. It will be forwarded promptly without obligation.

NIAGARA MACHINE & TOOL WORKS • BUFFALO, N.Y.
DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK • PHILADELPHIA
Dealers in principal U. S. cities and major foreign countries.



NIAGARA

STRAIGHT SIDE ECCENTRIC GEARED PRESSES

America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

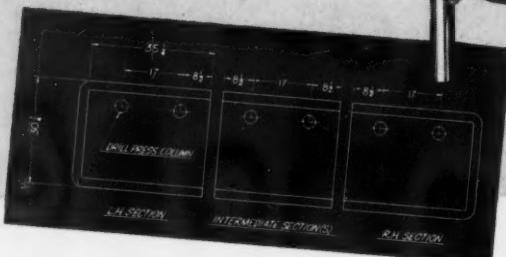


THIS

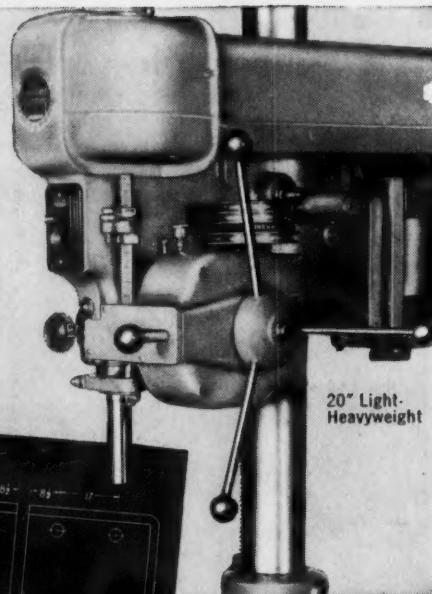


COMBINATION
cuts costs!

Standard Table Sections



20" Light-Heavyweight



Add as many spindles as you want—and multiply your savings—with this combination designed for economical production drilling. You will note, as indicated by the drawing and photos, that you may combine *any number of Table Sections* to accommodate just the right number of 20" **LIGHT-HEAVYWEIGHT** Drill Press Spindles to fit the specific jobs you have to do.

This **LIGHT-HEAVYWEIGHT** combination gives you the maximum in flexibility and economy. The number of

intermediate Table Sections determines the number of Spindles which can be varied to fit the nature of your work and output requirements. Best of all, you avoid the heavy expenditure for costly, specialized equipment.

Ask your Distributor to demonstrate the performance advantages of Walker-Turner **LIGHT-HEAVYWEIGHT** 20" Drill Press units. He has them in stock as Bench Models and Floor Models, and can specify Multi-spindle Models with exactly the number of drill heads you need.

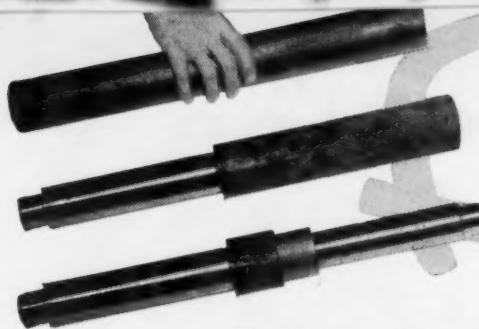


Walker-Turner LIGHT-HEAVYWEIGHT
20" Multi-spindle Drill Press
(Six Table Sections—12 Drilling Units)

WALKER-TURNER
• DIVISION •
KEARNEY AND TRECKER CORPORATION
PLAINFIELD, N.J.

DRILL PRESSES — Hand and Power Feed • RADIAL DRILLS • Wood and Metal Cutting BAND SAWS • TILTING ARBOR SAWS • RADIAL SAWS • JIG SAWS • LATHES • SPINDLE SHAPERS • JOINTERS • BELT AND DISC SURFACERS • FLEXIBLE SHAFT MACHINES

MMS-11

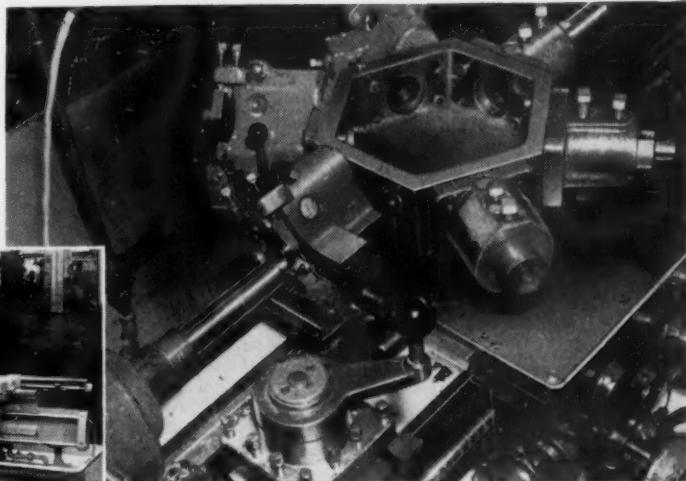
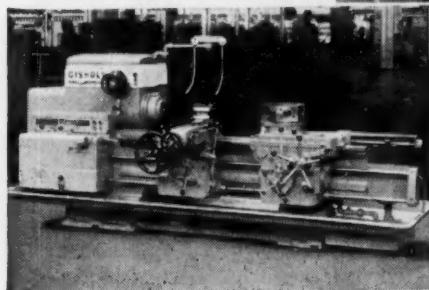


*take shaft jobs
Like This:*

they take less time on

GISHOLT TURRET LATHES

Yes, even in lots as small as 5 or 10 parts, you can't beat turret lathes on this kind of work. Parts are machined complete in 2 operations—total time is less than 4 min.



no extra equipment needed!



THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES . AUTOMATIC LATHES

SUPERFINISHERS . BALANCERS

SPECIAL MACHINES

With no more than your standard bar equipment, you're all set to cut machining costs on shafts like these. No previous operations . . . such as cutting to length or centering . . . are necessary. And with *two or more tools* from turret and side carriage, you have the basic advantage of turret lathe economy—the time saving that means lower costs.

Before you turn to extra equipment or special attachments, look into the possibilities of doing the job the quick and easy way on Gisholt Turret Lathes. Gisholt engineers will gladly help you.

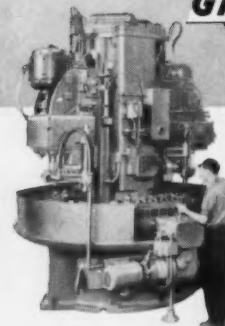
GISHOLT MACHINE COMPANY
MADISON 10, WISCONSIN

PRODUCTION MACHINERY

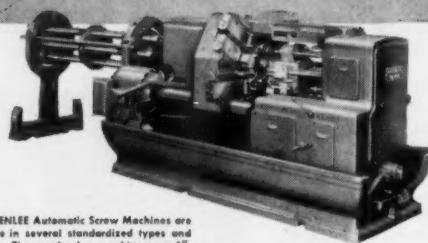
GREENLEE AUTOMATICS

PRODUCTION MACHINERY

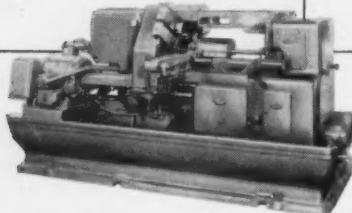
GREENLEE SPECIAL MACHINES



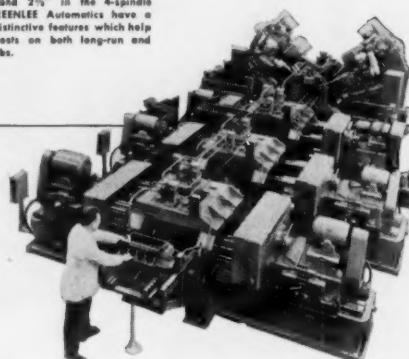
This is an example of a Vertical-type Special-purpose Four-station Automatic Indexing Machine designed and built to perform a number of important operations on connecting rods for an automobile engine.



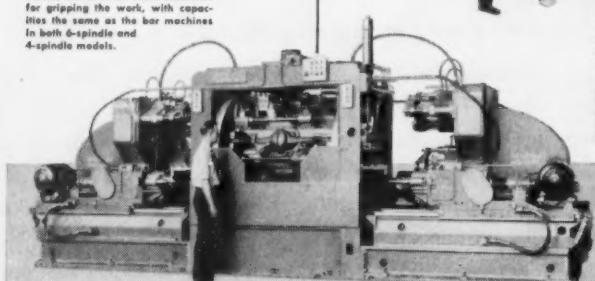
GREENLEE Automatic Screw Machines are made in semi-standardized types and sizes. The regular bar machines are 1", 1½", and 2" capacities in 6-spindle models, and 1½" and 2½" in the 4-spindle models. GREENLEE Automatics have a number of distinctive features which help to lower costs on both long-run and short-run jobs.



GREENLEE Automatics are also made for second operation work, an example of which is shown here. Collets are used on these machines for gripping the work, with capacities the same as the bar machines in both 6-spindle and 4-spindle models.



Since 1935 GREENLEE has pioneered in the design and manufacture of Automatic Transfer Machines especially used in the high-speed production of aircraft. The example shown here is a comparatively small and compact six-station machine which performs a group of operations on the ends and head faces of a V-8 cylinder block. Some of the bigger GREENLEE Transfer Machines will do several hundred operations in a cycle time of less than half a minute.



At the left is another GREENLEE Special Machine, in this case a Horizontal, Two-way, Four-station, Drilling, Boring, and Tapping Machine for finishing a series of holes in the ends of rear-axle housings. GREENLEE experience is available for the design and manufacture of a wide range of such cost-reducing machines.

GREENLEE BROS. & CO. 1891 Mason Ave., Rockford, Illinois

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES

AUTOMATIC SCREW MACHINES

AUTOMATIC TRANSFER MACHINES

**"STANDARD for
cutting metal and costs
since 1881"**



Red Shield says:

Cut machining costs... standardize with Standard. Complete line... top quality tools. Backed by factory application specialists coast to coast. Distributors in all principal cities.

STANDARD TOOL CO.

3950 CHESTER AVENUE CLEVELAND 14, OHIO



FACTORY BRANCHES IN: NEW YORK • DETROIT • CHICAGO • DALLAS • SAN FRANCISCO

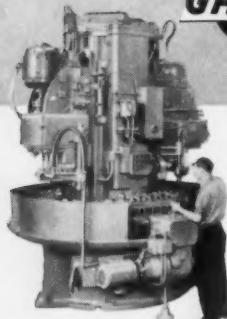
THE STANDARD LINE: Twist Drills • Reamers • Taps • Dies • Milling Cutters • End Mills • Hobs • Counterbores • Special Tools

PRODUCTION MACHINERY

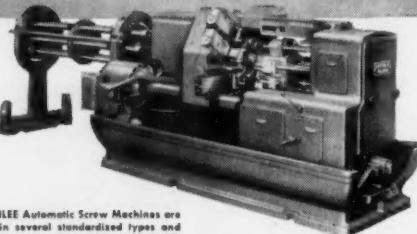
GREENLEE AUTOMATICS

PRODUCTION MACHINERY

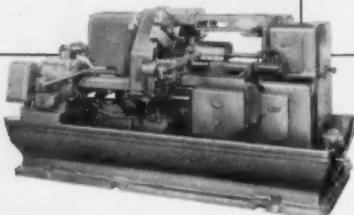
GREENLEE SPECIAL MACHINES



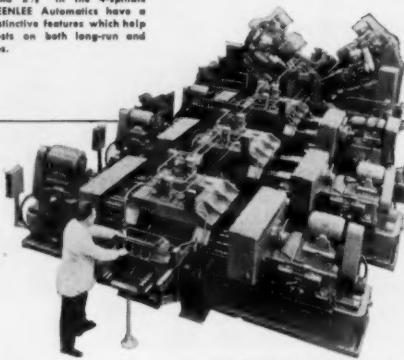
This is an example of a Vertical-type Special-purpose Four-station Automatic Indexing Machine designed and built to perform a number of important operations on connecting rods for an automobile engine.



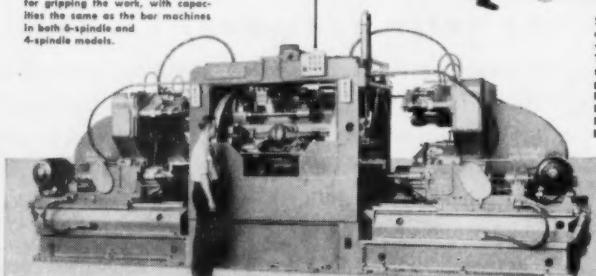
GREENLEE Automatic Screw Machines are made in several standardized types and sizes. The regular bar machines are 1", 1½", and 2" capacities in 6-spindle models, and 1½", 2", 2½", and 3" in the 4-spindle models. GREENLEE Automatics have a number of distinctive features which help to lower costs on both long-run and short-run jobs.



GREENLEE Automatics are also made for second operation work, an example of which is shown here. Collars are set on these machines for grinding the ends, with capacities the same as the bar machines in both 6-spindle and 4-spindle models.



Since 1935 GREENLEE has pioneered in the design and manufacture of Automatic Transfer Machines widely used in the big mass-production factories. The illustration shows the company's recently small and compact six-station machine which performs a group of operations on the ends and head faces of a V-8 cylinder block. Some of the bigger GREENLEE Transfer Machines will do several hundred operations in a cycle time of less than half a minute.



At the left is another GREENLEE Special Machine, in this case a Horizontal, Two-way, Four-station, Drilling, Boring, and Tapping Machine for finishing a series of holes in the ends of rear-axle housings. GREENLEE experience is available for the design and manufacture of a wide range of such cost-reducing machines.

GREENLEE BROS. & CO. 1891 Mason Ave., Rockford, Illinois

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES

AUTOMATIC SCREW MACHINES

AUTOMATIC TRANSFER MACHINES

**"STANDARD for
cutting metal and costs
since 1881"**



Red Shield says:

Cut machining costs... standardize with Standard. Complete line... top quality tools. Backed by factory application specialists coast to coast. Distributors in all principal cities.

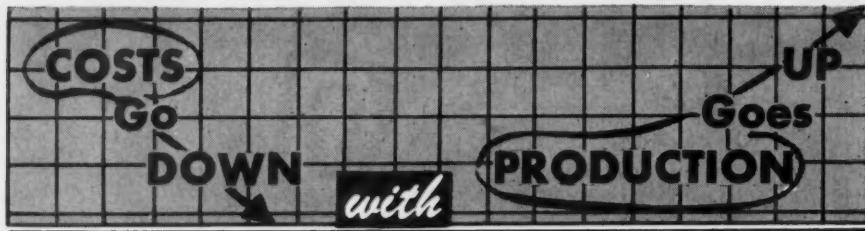
STANDARD TOOL Co.

3950 CHESTER AVENUE CLEVELAND 14, OHIO



FACTORY BRANCHES IN: NEW YORK • DETROIT • CHICAGO • DALLAS • SAN FRANCISCO

THE STANDARD LINE: Twist Drills • Reamers • Taps • Dies • Milling Cutters • End Mills • U-drills • Counterbores • Drill Bits



OLIVER ACE Universal Tool and Cutter Grinders

Simple to set up, easy to operate, the OLIVER ACE handles a wider range of cutters than do ordinary cutter grinders, yet requires no computation. With the ACE, time lags are cut to the bone . . . the simplicity of design and operation make economy of motion and fast grinding certain. The time-proved, soundly engineered Oliver ACE effects economies in floor space and less outlay in dollars for this truly superior type machine.



Direct Reading for Clearance

- Reduces Fatigue
- Eases Operators' Jobs

Especially qualified for grinding tungsten-carbide and high speed milling cutters and tools, the Oliver ACE has only one sliding part with ample bearing, efficiently protected from dust. Only two simple fixtures are required for a general range of cutters. Quick, accurate and easy . . . the ACE is maintaining its long-standing reputation in thousands of plants for doing the job for which it is built.

Priced to meet your budget, the ACE excels for grinding face mills up to 15" — also, slab mills • slitting saws • dovetail cutters • angular cutters • double angle cutters • Fellows helical cutters • reamers • taper reamers • production gashing and carbide tipped circular saws.

2 MODELS: Standard and Heavy Duty (illustrated)

Write Today for Complete Data

See our catalog in Sweet's Directory



OLIVER INSTRUMENT CO.

1430 E. MAUMEE • ADRIAN, MICHIGAN

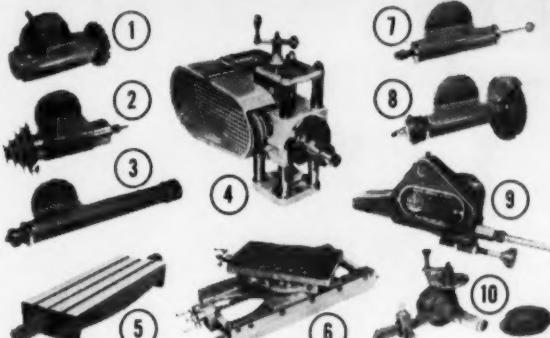
MACHINE TOOLS
by OLIVER include:

AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
TEMPLATE TOOL GRINDERS
FACE MILL GRINDERS
DIE MAKING MACHINES

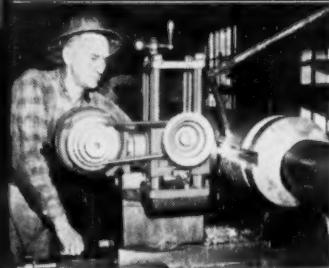


MASTER

MACHINE TOOL ATTACHMENTS



1. 90° Universal Milling Head
2. Hi-Speed Milling and Drilling Head
3. Deep-Hole Internal Grinder Head
4. Basic Milling Unit
5. Milling and Grinding Table
6. Universal Feed Table
7. Internal Grinder Head
8. External Grinder Head
9. Slotting and Keyseating Head
10. Geared Dividing Head



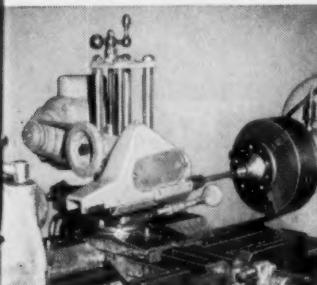
End Milling 2½" Keyway in 9½" Diameter shaft 22-ft. Long

MASTER LATHE CONVERTER

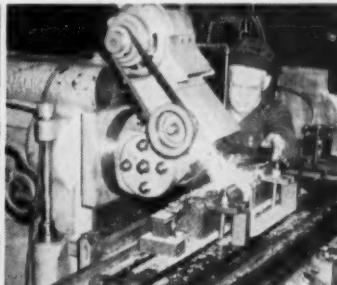
Model "C" ½ H. P. —
9" to 13" Lathes
Model "B" ½ or ¾ H. P. —
13" to 18" Lathes

THE REVOLUTIONARY NEW TURRET-MASTER is a small, compact, powered tool head for turret lathes, which powers the tool for either *on* or *off* center milling, drilling or boring, can be assembled for horizontal or vertical spindles. ½ to 3 H. P.

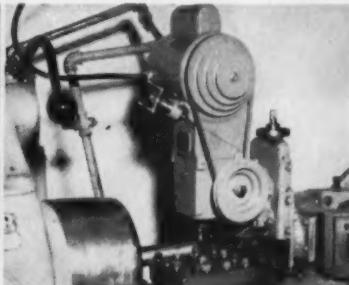
THE GEARED VERTICAL MILL HEAD amplifies operations of horizontal milling machines by combining independent power and double compounded swivel for angular positioning with capacities from ¼ H. P. to 5 H. P. For the cost of one single-purpose machine, you can have several Master units producing. *Prompt deliveries!*



Master Slitting Head on Lathe
Cutting Internal Taper Keyway



Geared Vertical Mill Head
on a Horizontal Mill



Turret-Master End Milling
Keyway on a Turret Lathe

*Increase Production on
LATHES, TURRETS, MILLS*

**Build Special Production Machines with
Master Heads and Independent Feed-
ing Mechanisms! Save Time and Money
by Relieving Your Independent Machines!**

The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, thread milling, boring, drilling, indexing, slotting, and keyseating, internal and external. Performs all operations for maintenance, tool room, and production at a minimum investment.

is available in four sizes:

Model "M" 1 to 3 H. P. —
18" to 72" Lathes
Model "H" 5 H. P. —
24" and Larger Lathes

Ask your nearest Master dealer to show you
the new 80-page Pictorial Operational Book.
Write direct for free 24-page Catalog.

FREE



MASTER MANUFACTURING CO.

FROM



1. 4-PURPOSE PRECISION PANTOGRAPH

The "Panto-Miller"

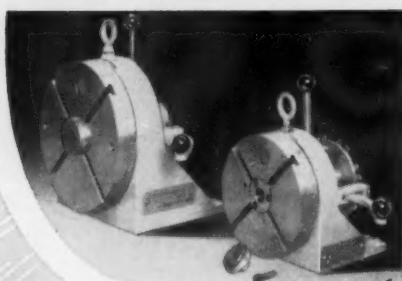
- Engraves
- Profiles
- Die Cuts
- Mills

A sturdy, production tool for 2-dimensional cutting in steel, cast iron, non-ferrous metals and plastics.

Pantograph reductions from 1:1 to 1:40. Spindle speeds infinitely variable from 1,200 to 11,500 RPM without belt changing.

Extreme accuracy and freedom of motion. Write for "Panto-Miller" details.

JOHNSON & BASSETT, INC. Production Tool Div.
BOX 1251, WORCESTER, MASSACHUSETTS, U. S. A.

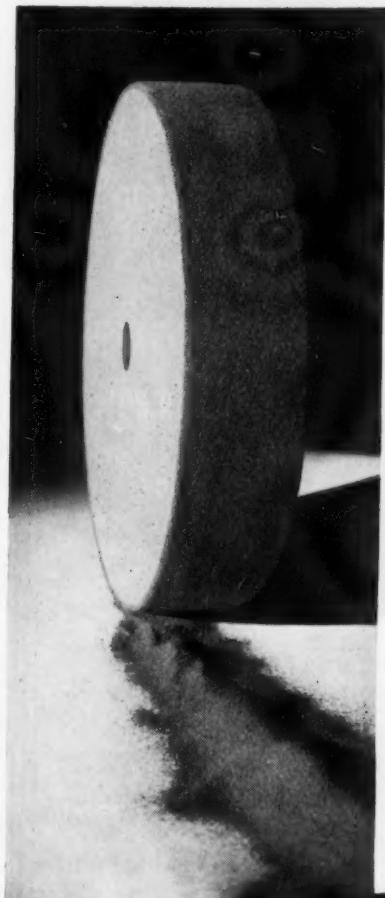


2. RAPID, ACCURATE JIG POSITIONING

This indexing trunnion, with station selector, accurately holds and locates either jig or work. **SIMPLIFIES JIGS. REDUCES SET-UP TIME.**

Ask for "TRUNNION" information

How ALUNDUM grain adds the profit-boosting "TOUCH of GOLD" to all your polishing wheel operations*



Norton ALUNDUM abrasive grain is extremely hard, tough and sharp. It is uniform in chemical composition, crystal structure and grain size — no oversize grains to mar the surface, no undersize grains to loaf on the job. Its high capillarity, produced by special Norton processing, means easier wetting with the glue and assures stronger, faster cutting, longer lasting wheel heads.

And you can get ALUNDUM grain in exactly the grain shapes and surface treatments you need to add the product-improving, money-saving "Touch of Gold" to every step of polishing, with every type of wheel and on every metal.

Watch your setting up temperatures!

Cold wheels and cold abrasive grain jell the hot glue too rapidly, which reduces its adhesive-ness and prevents sufficient pickup of grain, resulting in slow cutting, hot running wheel heads. To guard against this, pre-heat wheels and grain to between 100° and 120°F, so the glue solution can be applied at a temperature of 140°F. Also, hold the setting up room temperature around 80°F, use uniform pressure when rolling wheels in the grain trough.

Further helpful information on setting up — including the selection of ALUNDUM grain, preparation of glue, use of cement, drying operations, wheel types, polishing different metals, etc. — is contained in the Norton booklet *Setting Up Metal Polishing Wheels and Belts*. Your Norton Distributor can supply it, and can make quick deliveries of ALUNDUM grain. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

Making better products... to make other products better

NORTON

and its BEHR-MANNING division

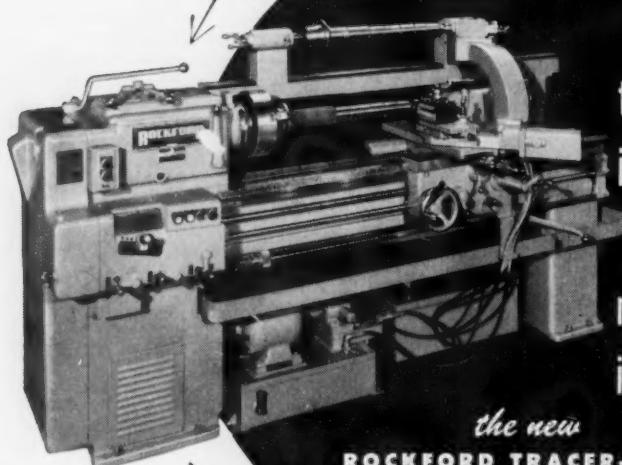
NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

ROCKFORD

MEDIUM-SIZED
ECONOMY-PRICED

DOES IT AGAIN!



the most value
in a tracer-lathe -
with
medium capital
investment

the new
ROCKFORD TRACER-LATHE
combines famous Rockford Features

with

Be sure to see this new production tool in operation. Witness the unusual accuracy and speed with which it cuts. Feel the ruggedness and power built into the Kopy Kat with the extremely sensitive feather-touch of the servo-mechanism control. Yet the cutting tool works with 400 lbs. unit pressure for positive finish and accuracy.

See your Rockford Machine Tool Co. representative today and have him arrange an appointment for you to see the new Rockford Tracer Lathe in action.

Unusual Tracer Sensitivity and Accuracy

Overhead Tracer Control Uses Either Production Sample or Flat Master

Self-contained, Easily Accessible Hydraulic Unit

Universal Cutting Slide with Positive Lock-Out for Manual Cutting

Four Position Turret Tool Post on Compound

ROCKFORD ECONOMY LATHES

6', 8', 10', 12' BEDS

MEDIUM-SIZED

ROCKFORD MACHINE TOOL CO.

18" Swing

ECONOMY-PRICED

2500 KISHWAUKEE STREET, ROCKFORD, ILLINOIS

TURN PIPE DREAMS
INTO PIPE BENDS

Prices
start
as low as
\$1575.00

•
(Motor and all
Electrical
Equipment
included)

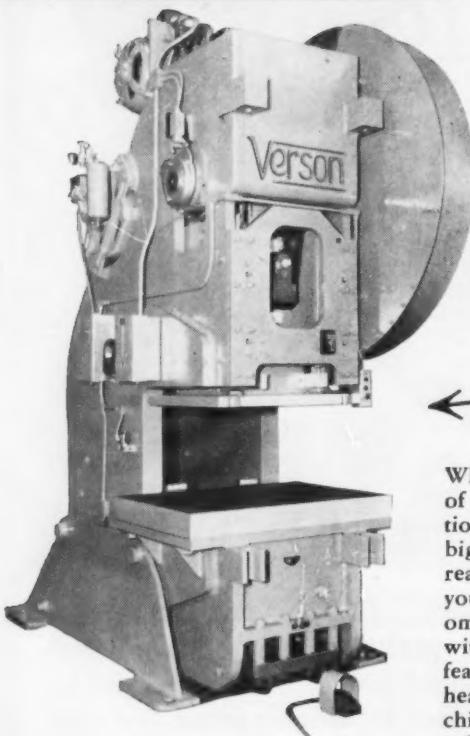


Pipe, tube and structural bending is now simplified with a PEDRICK PRODUCTION BENDER. Heretofore difficult bends, such as offsets and off-plane bends, can now be made in production quantities at an amazingly low cost. ALL PEDRICK PRODUCTION BENDERS are complete with motor, and are equipped with automatic duplicate bending relays.

Write for Descriptive Folder. Dept. 5.

PEDRICK TOOL & MACHINE CO.
3640 N. LAWRENCE ST., PHILADELPHIA 40, PA., U.S.A.

You get **BIG** press standards
of construction and performance



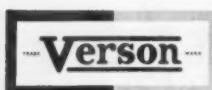
Write for your copy of the new
Verson Open Back Press Catalog.
It's just off the press.

in

TRADE
Verson MARK

O. B. I.'s

When you can combine the versatility of an O.B.I. press with the construction and performance standards of big, expensive machines, you get a real production tool that will give you the best possible long term economy . . . And that's just what you get with Verson O.B.I.'s. Just check these features—gears running in oil . . . heavy all-steel welded frame . . . machine cut steel gear and pinion . . . split cap main and crankpin bearings . . . mechanically interlocked pneumatic clutch and brake unit . . . full electric controls . . . many others.



ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION
VERSON ALLSTEEL PRESS CO.

9310 S. Kenwood Avenue, Chicago 19, Illinois
So. Lamar at Ledbetter Drive, Dallas, Texas

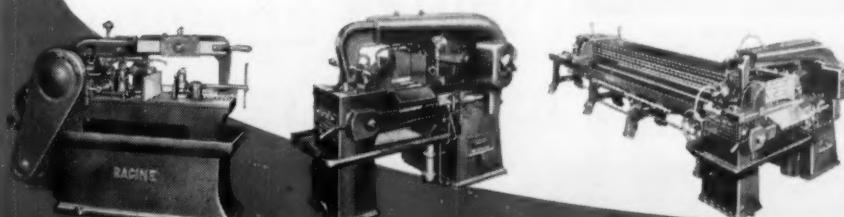
MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES
TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES



**STOP
THESE PROFITS
FROM GOING DOWN
THE DRAIN**

Obsolete metal-cutting equipment day by day increases your production costs. New, modern RACINE Metal-Cutting Machines save material, reduce cut-off time, and because of their extreme accuracy, lessen costly subsequent machining operations. Available are single-purpose or fully automatic bar-feed units in all capacities — 6" x 6" to 20" x 20".

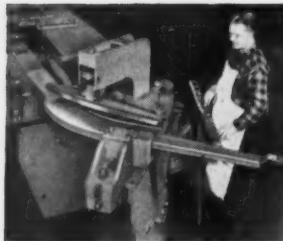
Write us about your metal-cutting needs and catalog of our complete metal-cutting saw line. Address: **RACINE HYDRAULICS & MACHINERY, INC.**, 2070 Albert St., Racine, Wisc.



RACINE

HOW MAJOR INDUSTRIES NOW CUT

Product Costs



2 HOLLOW TRACTOR BOOMS — Cold bending 12 ga. welded steel tapered tubes without distortion on Size 4 Pines unit eliminates expensive heat treatment. It saves tons of material for farm equipment manufacturer.



3 EXTRUDED WINDOW FRAMES — Part of production line set in large aluminum hollow frame that uses Pines Semi-Automatic saves space, accurately bends automobile window frame moldings.

4 REFRIGERATION AIR CONDITIONING ELLS — Special Pines Automatic Cut-Off Benders now produce copper ells and return bends at speeds up to 1500 per hour, reduce scrap losses to 1%.



1 AIRCRAFT TUBING — Smooth, extra sharp bends now produced in ultra-thin stainless steel tubing, saves space and \$14,000 per plane for aircraft manufacturer. Shown above, Pines Size 4 Unit forming wrinkle-free 8" c/l radius bend in 4" x .020" S. S. tubing.

with PINES PRODUCTION BENDERS

The examples shown here are a few of the countless number of production jobs that are now handled efficiently and more profitably on Pines Automatic Benders. They illustrate the versatility and the many cost-cutting advantages of cold forming round, square, rectangular, extruded, or hollow stock the "Pines-Way". Simplicity of tooling, uniform accuracy, and ease of operation are proven features of Pines machines which today help hundreds of plants cut product costs. At Pines you'll find an unmatched wealth of bending experience and creative tooling skill readily available to help you develop better methods and save time on production problems.

Write for
Free data sheets

To keep abreast with latest developments in bending, write for copies of "Pines News" — bi-monthly mailing piece that gives facts on new, cost-cutting bending applications.



PINES ENGINEERING CO., INC.
Specialists in Tube Fabricating Machinery

642 WALNUT • AURORA, ILLINOIS

5 ENGINE MANIFOLD TUBES — Short 1½" O. D. steel tube now bent to 1½" c/l radius with flange attached saves space, insures accuracy, cuts costs.

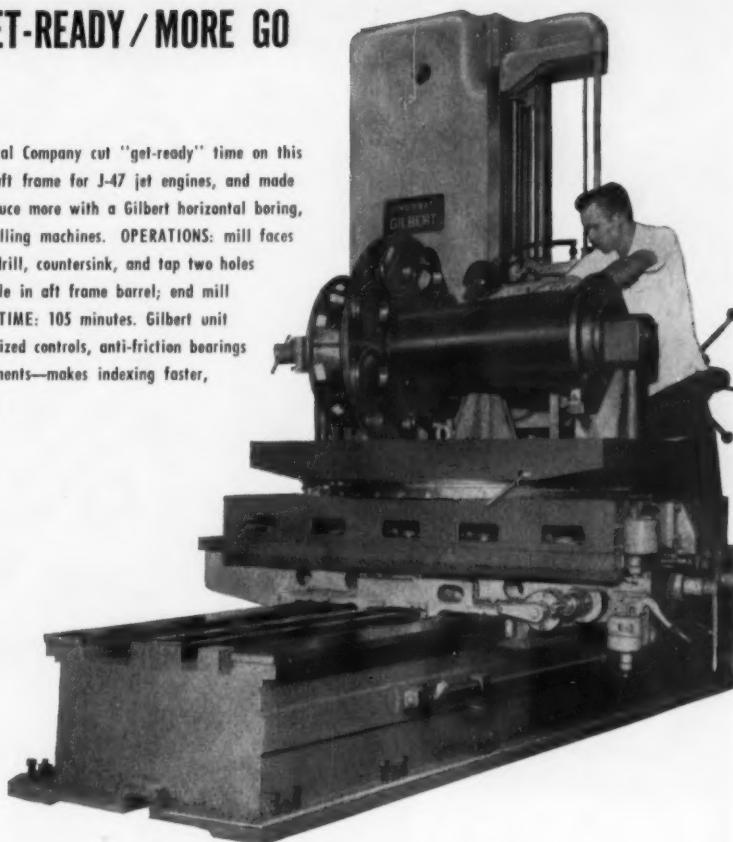


6 BOILER TUBE AND REFRIGERATION COILS — Typical setup bending continuous serpentine coils from 3/4" steel tubing. Reduces welding, lubricating costs. Other installations range from 1/4" copper up to 3" steel tube.



LESS GET-READY / MORE GO

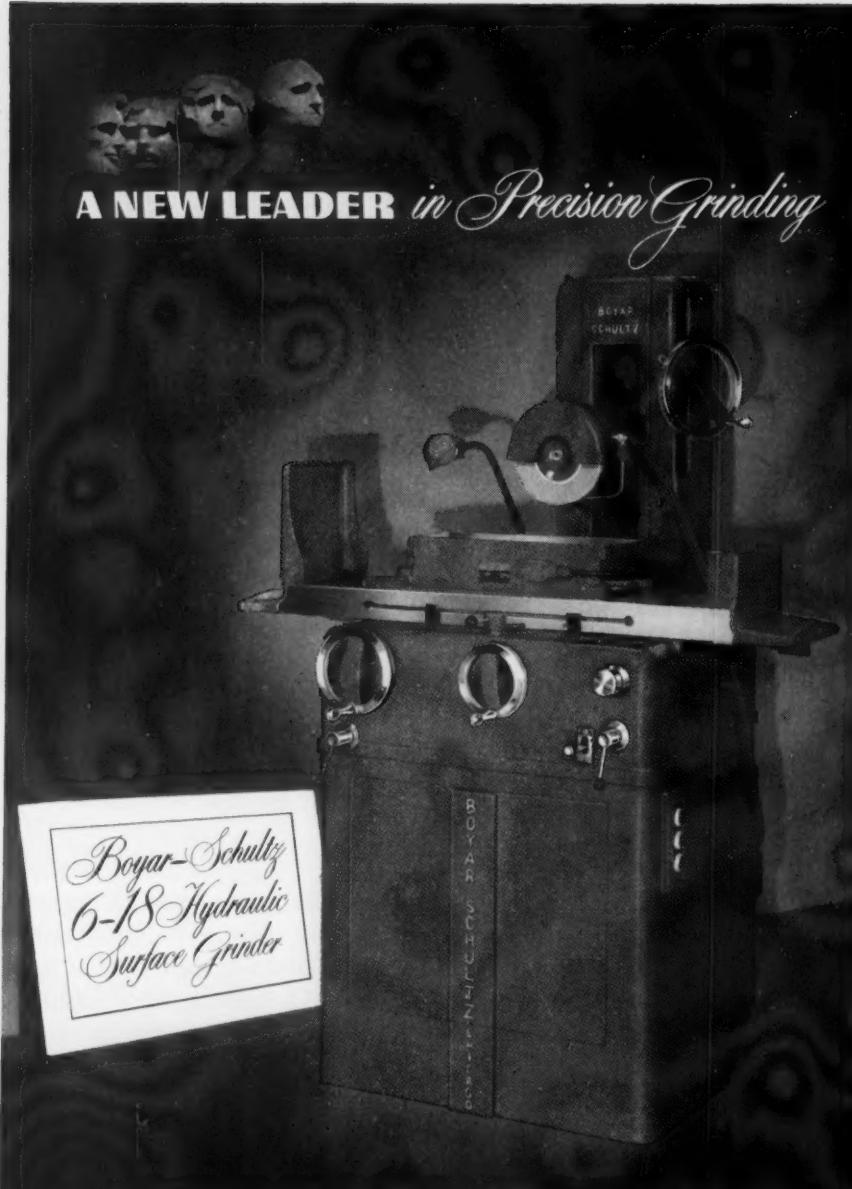
Ryan Aeronautical Company cut "get-ready" time on this stainless steel aft frame for J-47 jet engines, and made "go" time produce more with a Gilbert horizontal boring, drilling, and milling machines. OPERATIONS: mill faces of lifting pad; drill, countersink, and tap two holes in pad; drill hole in aft frame barrel; and mill three scallops. TIME: 105 minutes. Gilbert unit head has centralized controls, anti-friction bearings on hand adjustments—makes indexing faster, operation easier.



"Those who buy Gilbert buy Gilbert again" because of the efficiency of the single spindle and unit head design, ample capacity for most boring requirements, plenty of power for fast and heavy cuts with carbide tools, sustained accuracy in long, hard service. 3½-inch spindle, table and floor type boring mills available in a wide variety of arrangements. Write for Bulletin 953.

G I L B E R T

THE CINCINNATI GILBERT MACHINE TOOL COMPANY • 3366 BEEKMAN STREET, CINCINNATI 23, OHIO



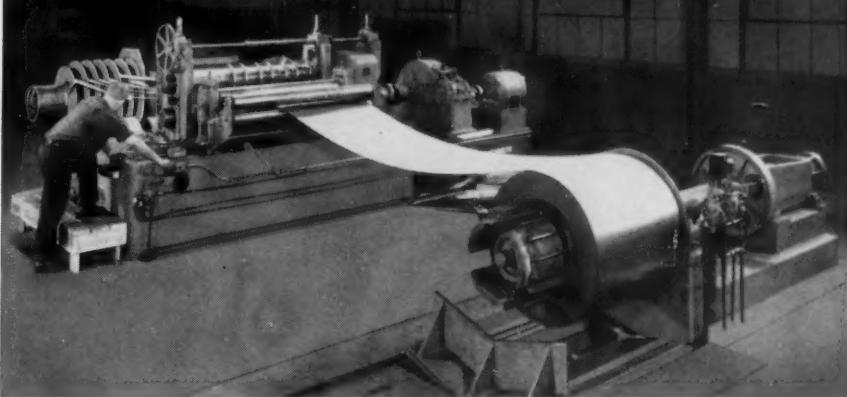
A NEW LEADER in *Precision Grinding*

Boyar-Schultz
6-18 Hydraulic
Surface Grinder

BOYAR-SCHULTZ CORPORATION

2020 South 25th Avenue, Dept. C-N, Broadview, Illinois

YODER *Multiple Rotary* SLITTERS



pay Four Kinds of Dividends!

If you use 100 tons or more of coiled strip or sheets per month, in special widths, the installation of a Yoder Slitter will pay four kinds of dividends:

1. Savings of \$10 to \$30 per ton by buying standard widths instead of slit strands. This saving alone often pays for the Slitter investment in a year or less.
2. You can buy standard widths competitively, wherever you can obtain the best quality, price and delivery.
3. Greatly reduced inventory requirements. From a relatively small stock of standard widths you can meet your own needs for special widths in a few hours.
4. Better control of production schedules since slitting service no longer is a problem.

Yoder slitters, uncoilers, recoilers and other accessories are made in many sizes and capacities, from the smallest to the largest. The Yoder Slitter Book is a treatise on the economics as well as mechanics of slitter operation—send for it.

THE YODER COMPANY • 5532 Walworth Ave., Cleveland 2, Ohio

Complete Production Lines

- * COLD-ROLL-FORMING and auxiliary machinery
- * GANG SLITTING LINES for Coils and Sheets
- * PIPE and TUBE MILLS—cold forming and welding





Down to the steel with chips

A glance at the spark flow tells you this CARBORUNDUM® Brand Abrasive Belt removes huge amounts of stock ... fast. But that's not all—it also produces uniform finish, eliminates extra operations. The versatility and economy demonstrated by this swing

frame belt grinder is yours to command on *any* metalworking operation, from deburring and polishing to weld grinding and snagging, with Abrasive Belts by CARBORUNDUM. They cut fast, cool...give smooth, even finish...long, useful life.

Whether you use $1\frac{1}{2}$ " belts on deburring machines, 7/4" belts on stainless steel sheet polishers—or any size between—your CARBORUNDUM Distributor is a good man to know. He offers expert counsel, complete stocks, prompt service.

Through application "know-how" and product quality

CARBORUNDUM

REGISTERED TRADE MARK

continually puts more **sense** in your abrasive **dollar**



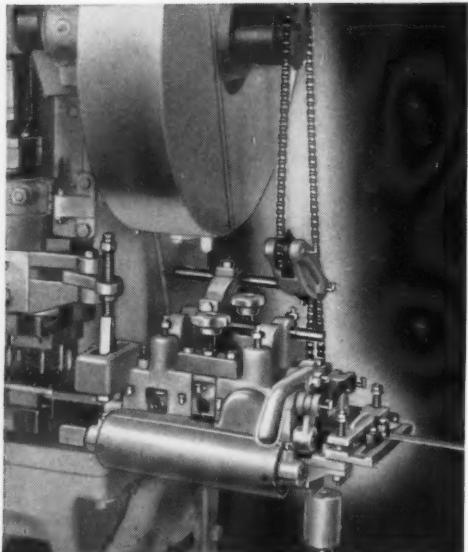
RAPID-FIRE PRODUCTION

from your PUNCH PRESSES

IT'S EASY WITH

WITTEK

Automatic Roll Feeds



Step up production by making your punch presses automatic! Wittek automatic roll feeds fit all makes and sizes of punch presses — provide maximum efficiency and extreme accuracy in the high-speed automatic feeding of strip stock. They are made in single roll, double roll, and compound types with straighteners, in models to feed (push or pull) in any of four directions. Length of feed is quickly and easily adjusted to meet individual job requirements.



4404

WITTEK Reel Stands

Simplify Handling of Coiled Stock

A choice of standard models is available to facilitate handling a large variety of coiled stock... from small, light coils to those weighing up to 800 pounds. These larger reel stands automatically center the coils and provide frictional braking action to prevent overrunning and maintain uniform coil slack.

Write for full particulars

WITTEK Manufacturing Co.

4322 W. 24th Place, Chicago 23, Illinois

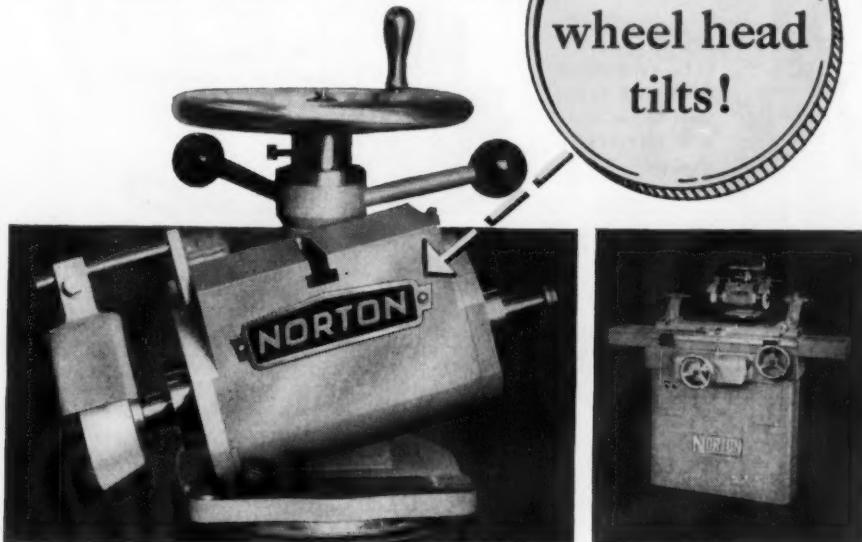
Automatic
ROLL FEEDS AND
REEL STANDS



No other cutter and tool grinder does...

*so many jobs so fast,
so easily, as the
Norton No. 20, because...*

the
wheel head
tilts!



Greater versatility featured!

The Norton No. 20 cutter and tool grinder brings new speed and economy to the widest range of tool and cutter grinding jobs. It adds value to every piece of work it grinds . . . brings you more speed, more product value, more profit.

The wheel head can be tilted up to 15° above or below horizontal, and swivelled through 360°—simplifying such ordinarily difficult jobs as grinding taper reamers, step counterbores, form tools and milling cutters.

Other pace-setting advantages that make this Norton cutter and tool grinder easier to set up and more profitable to operate include: long table traverse and wheel slide travel . . . integral motor spindle . . . centrally located column elevating hand wheel . . . wheel slide graduated dial readable from any position . . . automatically lubricated table ways . . . electric equipment built to Machine Tool Builders' standards.

Only one of the world's most complete line of grinding machines, the No. 20 is a typical development of Norton's engineering leadership. Remember — only Norton offers you such long experience in both grind-

ing machines and wheels to help you produce more at lower cost.

Why not investigate how the No. 20 can modernize and speed up tool and cutter grinding in your plant? See your Norton Representative for detailed information—and ask him about Norton cutter and tool grinders Nos. 1 and 2, and the BURA-WAY Grinder for automatic lathe tools. Meanwhile, write direct for Catalog 189, NORTON COMPANY, MACHINE DIVISION, Worcester 6, Mass. In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5.

To Economize, Modernize with NEW

NORTON
GRINDERS and LAPPERS

Making better products . . . to make other products better

District Sales Offices:
Hartford • New York • Cleveland • Chicago • Detroit

In Defense or Peace

ECLIPSE *Specials*

.... ARE THE BEST BUY!



Eclipse Radial
Drive High Speed
Steel Cutter bores
5 diameters in
steel part.



Special Cutter forms
ball seat in road build-
ing machinery unit.



Tungsten Carbide Tipped
Cutter precision bores three
diameters in aluminum
gear case.



Radial Drive
Tungsten Carbide
Tipped Cutter
bores gear pocket
in oil pump.



Multi-diameter cut-
ter with Tungsten
Carbide Tipped in-
serted blades for
boring, counterbor-
ing and chamfering.

Since 1913—through two wars and during the peace years—Eclipse has met the exacting and changing demands of industry for special purpose end cutting tools. What better test? What better recommendation? Our large modern plant can serve you, too. Send your problem to us, today!

ECLIPSE COUNTERBORE CO.

Founded in 1913

DETROIT 20, MICHIGAN

in MILL HEADS

RUSNOK

Builds the **BEST** Quality
at the **BEST** Price

1/4 H.P. CONVERTICAL MILL HEAD

Only low cost mill head with quill travel attachment.

High speed medium-light operation.

For bench, floor and pedestal mills.

Fits milling machines with overarm 1½" to 3".
¾" end mill capacity.

\$24500



RUSNOK

1/2 H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT

Fits milling machines with 3" to 5" overarm.

¾" end mill capacity.

For vertical, horizontal and angular operations.

1 H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT

Fits milling machines with 3" to 5" overarm.

¾" end mill capacity.

For vertical, horizontal and angular operations.

RUSNOK

MILLING • DRILLING • BORING

RUSNOK TOOL WORKS

4840 West North Ave., Chicago 39, Ill.

DEALERS IN ALL PRINCIPAL CITIES



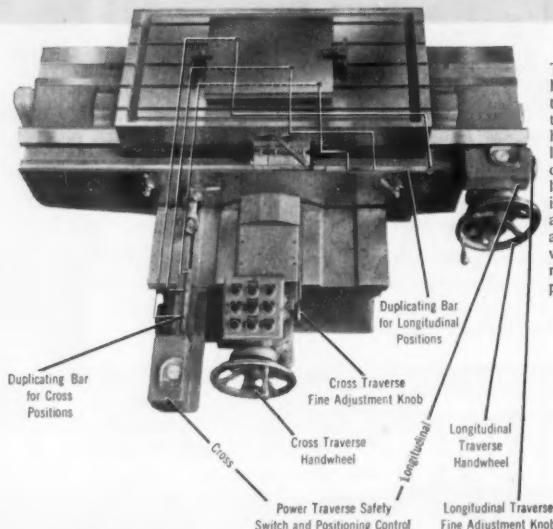
*Here's another reason
it pays to get a proposal
from Fosdick*

"Boring time cut 25% on 'one-time'"

with our Fosdick Automatic Positioning Jig Borer," says Hiser Jig Grinding Co.

"We had to hold a tolerance of $\pm .0005$ " on the index and some 30 locating and bushing holes on a multiple spindle drill jig. This jig is used to drill a housing control valve for the power steering attachment of a large automobile manufacturer. Using our Fosdick Jig Borer with Automatic Positioning, we were able to hold this tolerance easily and finish the job in record time. Our Fosdick takes care of our large variety of precision drilling and boring operations on tools, dies, gages, fixtures and jigs. We are glad we got our proposal from Fosdick."

Fosdick Automatic Positioning



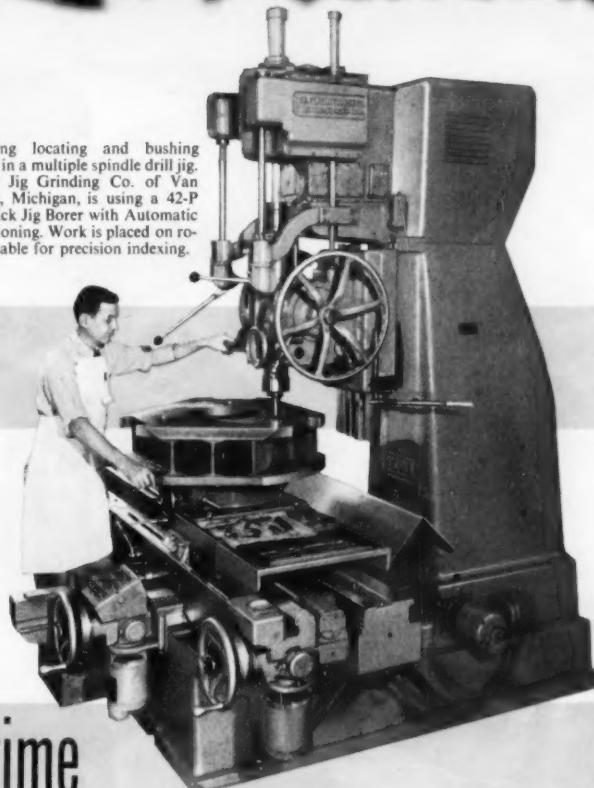
Top view of positioner showing location of duplicating bars in troughs, typical job set-up of table. Note how bars locate hole centers in the work, lengthwise and crosswise. For operator convenience, bars are located within easy reach. Holes in bars are keyed with letters and numbers to identify them at a glance with holes in the work. On "one-time" jobs, measuring rods can be used in place of bars.



Radial Drills

Drilling locating and bushing holes in a multiple spindle drill jig. Hiser Jig Grinding Co. of Van Dyke, Michigan, is using a 42-P Fosdick Jig Borer with Automatic Positioning. Work is placed on rotary table for precision indexing.

jobs



saves time

on 'one-time' jobs as well as precision production.

Fosdick builds Automatic Positioning into its Jig Borers to give you $\pm .0001"$ table positioning in seconds simply by pressing a button. Automatic Positioning can cut the cost of boring jigs, or can eliminate jigs entirely. Gives exact reproduction of drilled, bored, tapped and reamed parts. You get rapid precision in production or one-time jobs, without experienced operators. For fast tool chang-

ing with Automatic Positioning, the Fosdick BF Spindle enables you to change tools in seconds, while the machine positions . . . repeating hole size to $\pm .0001"$ without resetting.

For full information on the Fosdick Jig Borer with Automatic Positioning, send for Catalog 17P-A.

Need Drilling Equipment? Get a Proposal from Fosdick!



Sensitive and
Upright Drills



Sensitive
Radial Drills



Automatic
Positioning
Machines

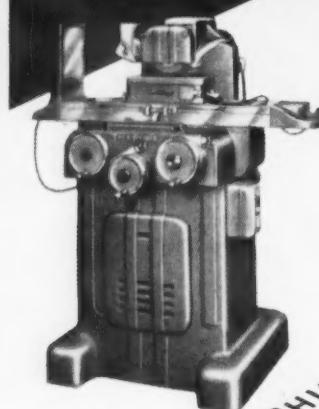
FOSDICK

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO



T-P SUPERPOWER MAGNETIC CHUCKS

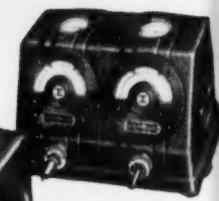
SIMPLIFY and SPEED



T-P MACHINE TOOLS



T-P Comparator



PRECISION WORK



with these STANDARD TAFT-PEIRCE PRODUCTS

Chances are you're already using many items from some of these Taft-Peirce product lines. You should know them all. Each has certain exclusive advantages that set it apart from competitive products. Many of them are actually not competitive at all — since in their own specific field of application, nothing else compares. For example:

T-P Superpower Electro-Magnetic Chucks pack more power in less space. New T-P Permanent Magnet Chucks are longer, stronger, 20% lower — give greater clearance on machine tool tables.

T-P #1 Surface Grinders and Lapping Machines make it easy to produce surfaces to an accuracy, flatness, and finish previously considered difficult or impossible.

T-P CompAIRators measure a wider range and variety of work than any other air gage. The COMPUTING CompAIRator also solves simple problems...simplifies many complex measurements.

T-P Rotochek, a valuable part of the T-P line of fixed gages, is the fastest thread gaging method yet devised. Just push — and the gage enters the work. Pull — and it disengages automatically.

T-P Tool Room Equipment includes many special time-and-labor-saving devices such as Multiplex Angle Irons, the extra wear-resistant T-P Granite Surface Plates, and Precision Levels to mention only a few.

Each of these products is part of a complete Taft-Peirce line. Available in standard or special models tailored to your needs. Full details are described in the new Taft-Peirce Handbook. Write for your copy today.



*T-P means
Top Precision*

THE TAFT-PEIRCE MANUFACTURING COMPANY • WOONSOCKET, RHODE ISLAND

"LATHEDOG" LEARNS ABOUT LATHE APRONS



center on . . .

For a clear comparison of Cincinnati Lathes with other equipment, write for a free copy of "Management Facts About Lathes."

cincinnati

J.R.WILLIAMS

IF HE KNEW
WHAT HE WUZ
DOIN', HE'D
BE RAVING
OVER THE
CONVENIENT
CONTROLS
AND SAFETY
FEATURES OF
THE APRON
ON THAT NEW
LATHE!



Large-size prints of this
J.R. Williams cartoon
are available.



When the boss catches up with Lathedog, he'll learn that the apron on a Cincinnati LT Lathe is about the most convenient ever built. With a spindle start-stop lever plus cross and longitudinal feed levers that lift to engage, even Lathedog will have a hard time making a mistake. Shop men appreciate the high-priced features on low-cost Cincinnati Lathes. That's why they like to run them.

1. All geared headstock
2. 12 spindle speeds in geometric progression
3. One-shot lubrication of carriage ways and cross slide
4. Ground bedway (flame-hardened at extra cost)
5. Tapered key drive spindle nose
6. Multiple disc clutch and brake
7. 32 thread and feed changes
8. Forged steel spindle and all headstock shafts mounted in precision antifriction bearings

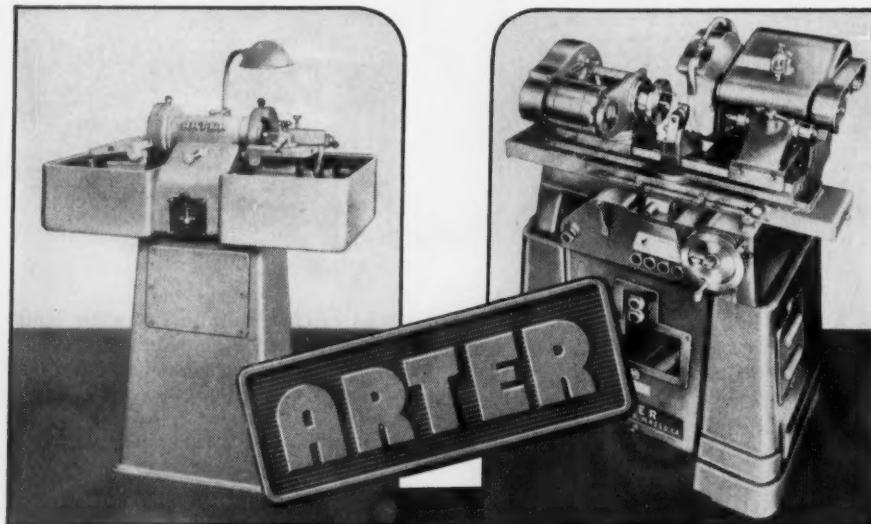
Other products: Cincinnati Tray-Top Lathes and Cincinnati Bench, Floor and Radial Drills.

For complete catalogs, prices and name of your local dealer, write on company letterhead to Cincinnati Lathe & Tool Co., 3265 Disney, Cincinnati 9, Ohio.

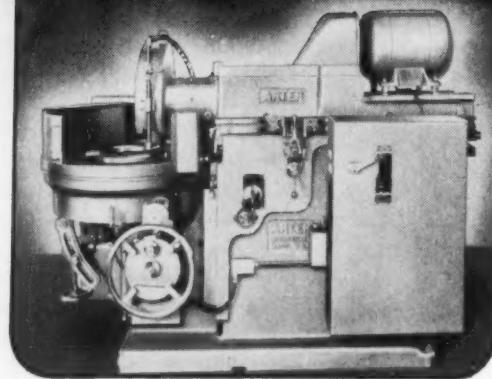
lathes and drills



The Arter Family of Machines



CARBIDE
TOOL
GRINDERS



CYLINDRICAL
GRINDERS
INTERNAL
GRINDERS

ROTARY SURFACE GRINDERS

Chuck Capacity 8" to 40"

The Arter trademark on these machines is the sign of
ACCURACY • POWER • DEPENDABILITY.

Tell our engineers your grinding problems.
They'll find a way to lick them.

ARTER GRINDING MACHINE COMPANY
WORCESTER • MASSACHUSETTS

Agents in industrial centers of United States and Canada



TIGHTEN YOUR GRIP ON PRODUCTION

Production flows faster and smoother when your machine tools are equipped with Jacobs Chucks.

Rugged construction, great gripping power and accuracy have made The Jacobs Plain Bearing Drill Chuck the choice of machinists throughout the world.

The Jacobs Manufacturing Company, West Hartford 10, Connecticut.

IF IT'S A **JACOBS** IT HOLDS

Jacobs and your local distributor

are ready to deliver the chucks you need and the service you deserve.

... first in chucks

... first in service

NO down



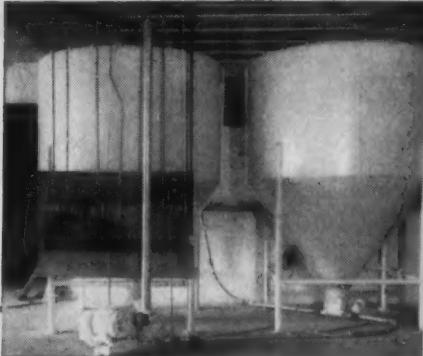
Photos courtesy Century Machine Company,
4434 Marberg Avenue, Cincinnati 9, Ohio

time in 16 years...

The records of the Century Machine Company show "no down time in sixteen years use" on this Cincinnati Press Brake.

This machine, working a 9½ hour day, forms light gauge sheets in mild and stainless steel up to $\frac{1}{4}$ " thickness. It is constantly producing accurate parts for easy assembly of Century's baking ovens and bakery machinery.

Write for free Vinyl Plastic Tonnage chart TC-8 on your company's stationery.



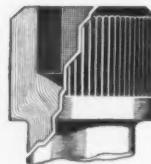
• Flour Storage Bins—each 1000 lbs. capacity

THE CINCINNATI SHAPER CO.

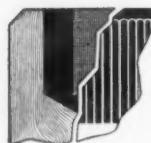
CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES

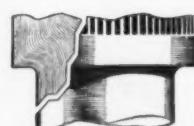




HEAD. Forged for maximum physical strength. Diameter and height are precision controlled—any deviation could be serious. Knurls, originated by SPS, provide easier handling and faster assembly by oily fingers.



SOCKET. Uniform depth and size assure strength and maximum torque in wrenching—extremely important in such a screw.



FILLET. Completely formed to provide maximum resistance to shear and continuous grain flow throughout length of screw.

There's much more to an UNBRAKO than meets the eye

When you pick up a socket cap screw, you don't stop to examine it—it's so commonplace.

If you did, and it's an UNBRAKO, you'd marvel at the knurled head, the uniform hex socket, the smooth shank, the precision threads, all combined to make a strong, close tolerance fastener.

Quality control—from the selected alloy steels to the finished product—makes an UNBRAKO Socket Cap Screw what it is, the finest you can buy. Write for UNBRAKO Standards. STANDARD PRESSED STEEL Co., Jenkintown 22, Pa.



SOCKET SCREW DIVISION

SPS

JENKINTOWN PENNSYLVANIA



THREADS. Fully formed to maintain continuous grain flow and prevent shearing. Made to Class 3 fit. Controlled fillet at root of threads gives added tensile and fatigue strength.



UNBRAKO Standards—as listed in the SPS Catalog—are stocked by leading industrial distributors everywhere.

over the editor's desk

Expanding Markets

IN appraising business conditions today it is important to consider the rate at which our national population is increasing—a rate of population growth never before equalled in history and one which represents an ever increasing market to everyone engaged in the manufacture of metal products. There were four million births in 1953. This means that every month America added enough people to populate a city the size of Toledo, Ohio, or Norfolk, Virginia, or Omaha, Nebraska.

The people of this country are living to a considerably greater age than they did just a few years ago. The life expectancy experts figure that by 1960 there will be more than fifteen and one half million people over 65 years of age living in America. We should not lose sight of the fact that this figure represents a tremendous amount of accumulated experience and skills, as well as a continuing market for goods and services.

People in America are getting married younger and raising bigger families. In 1953, there were 91 per cent more couples having their second child than in 1940. Births of third children were 86 per cent greater. There were 60 per cent more fourth children. And the incidence of a fifth child was up considerably—something like 15 per cent.

As our population continues to grow, we will have more people, individually and collectively, who want more and

better goods and services, all of which adds up to markets—expanding markets for a long time to come.

Metal Exposition

AS you read through this issue, you will note that we have once again placed a considerable amount of emphasis upon the forthcoming National Metal Congress and Exposition which is being held this month at the International Amphitheatre in Chicago. And once again we would like to urge the readers of this magazine to take time out from their busy work schedules to visit this important Exposition. In Chicago during the week of November 1 the opportunity will be afforded to view the latest developments in metalworking methods and practice, plus the opportunity to discuss problems personally with the outstanding men in the field who present papers before the technical sessions.

A visit to this year's Exposition, where hundreds of idea-laden exhibits will be on display, will help you to do the job ahead just a little better. The following timetable explains the hours during which the Exposition will be open for visitation.

Nov. 1 Monday	12 noon - 10:30 p.m.
Nov. 2 Tuesday	12 noon - 10:30 p.m.
Nov. 3 Wednesday	12 noon - 10:30 p.m.
Nov. 4 Thursday	10:00 a.m. - 6:00 p.m.
Nov. 5 Friday	10:00 a.m. - 6:00 p.m.



Seven air compressors, running 20-24 hours a day, give excellent service at the Allen-Stevens Corporation, Jamaica, New York.

Job-Site compressor plants keep pressures UP · keep air costs DOWN

- Use several small air compressors instead of one big one and you'll reduce operating costs and repairs—and keep production running smoothly.

Several small compressors, piping air through a common manifold or to individual groups of equipment, give you continuous service. You're never without air. When one compressor plant is down for routine maintenance the others can carry the load temporarily. When air requirements slack off, during night shifts or seasonal periods, some of the compressors in the gang can be shut off to reduce wear and operating costs. And, when air require-

ments exceed the present capacity another small compressor can be added—economically.

When you plan your *job-site* air supply, be sure to use dependable Westinghouse Air Compressors. They come in a wide range of sizes, and feature such exclusives as: controlled pressure lubrication, low oil level protection, positive starting unloader.

Your Westinghouse Air Compressor distributor has a complete stock of compressors and accessories. He can give you fast, efficient repair service, and a complete survey of your air requirements.



LE ROI COMPANY

A Subsidiary of Westinghouse Air Brake Co.

MILWAUKEE 14, WISCONSIN

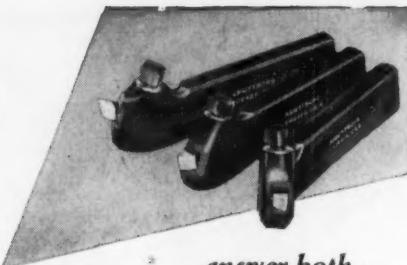
Plants: Milwaukee • Cleveland — Greenwich — Dunkirk, Ohio
Coldwater, Michigan

Manufacturers of air compressors, rock drills, engines, loaders and mixers.

Factory Branch: EMERYVILLE, CALIF. Distributors throughout the United States . . .
Consult your Classified Directory. Distributed in Canada by: Canadian Westinghouse Co., Ltd., Hamilton, Ont.



ARMSTRONG TOOL HOLDERS



answer both ...

1. *The problem of lowering costs*
2. *The problem of increasing output*

By providing permanent, multi-purpose, inexpensive ARMSTRONG TOOL HOLDERS that use cutters or bits that are quickly ground from standard high speed shapes (Saving: All Forging, 70% Grinding and 90% High Speed Steel), the Armstrong System of Tool Holders will reduce your tool cost to an absolute minimum.

By providing stronger, more efficient tools, carefully developed for each operation, as well as ARMSTRONG High Speed Steel, ARMALOY Cast Alloy Cutter Bits or Armide Carbide-Tipped Cutters as required for each job, ARMSTRONG TOOL HOLDERS permit greatly increased speeds and feeds, enable you to increase the hourly output of every lathe, planer, slotter, shaper, turret lathe and screw machine.

There is no surer way to lower costs and increase output, than to use the correct ARMSTRONG TOOL HOLDER for each operation on all machines.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5228 W. Armstrong Ave. Chicago 30, U.S.A.

Eastern Warehouse and Sales: 199 Lafayette St., N. Y. 12, N. Y.
Pacific Coast Whse. & Sales Office: 67 Eleventh St., San Francisco 3, Calif.



the
up
the
up
al
ca

th
v
f
a
s
c
l
e
t
the
up
the
up
al
ca

th
v
f
a
s
c
l
e
t

MODERN Machine Shop

Vol. 27, No. 6
NOVEMBER, 1954

features
in this issue

Production by Resistance Upset

By Gilbert C. Close

In this article, the author outlines procedures and equipment employed by Thompson Products, Inc., Bell, Calif., in producing engine valves, hydraulic valves, end fittings and other parts by a new resistance upsetting technique. Page 116.

Multiplying Your Efforts

By Alfred M. Cooper

The author takes a searching look into the techniques which distinguish good from bad supervision and makes recommendations for correcting bad situations. Page 128.

How to Machine Magnetic Ingot Iron

By W. E. McFee

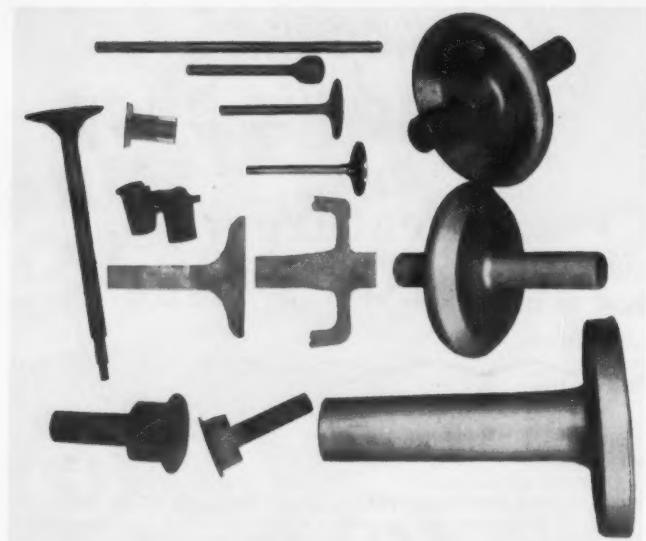
This article provides a summary of helpful suggestions for machining magnetic ingot iron, based on actual shop experience. Page 136.

36th National Metal Congress and Exposition

The complete programs of the four societies (American Society for Metals, American Welding Society, Institute of Metals Division of American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing) sponsoring this Congress and Exposition are to be found between pages 146 and 196. A list of exhibitors, complete with floor plans of the Exposition, begins on page 200. A section illustrating and describing equipment and materials to be displayed at the Metal Show commences on page 222.

Coming Next Issue

The December "Services for Sales" issue of MODERN MACHINE SHOP will feature editorial articles designed to inform production executives in metalworking plants of the helpful services being offered by various manufacturers of metalworking equipment and supplies. In addition, as an aid for the busy production executive who is looking for services to help solve production problems, this issue will also present a listing of the services offered by hundreds of metalworking equipment manufacturers and suppliers. Watch for it!



Typical upset parts: (top left) steps in producing an engine valve; (extreme right) gear blanks; (center left and lower left) typical piston configurations.

Production by Resistance Upset

By GILBERT C. CLOSE

In which the author outlines procedures and equipment employed in producing engine valves, hydraulic pistons, end fittings and other parts by a new resistance upsetting technique.

SPECIFICALLY, what are the advantages of resistance upsetting?

This question, put bluntly to engineers at Thompson Products, Inc., Bell, California, brought answers that were just as specific. Furthermore, the answers carried authority. During the past 15 years, Thompson Products, Inc., has be-

come a national leader in the production of precision parts using the resistance upsetting technique.

Summarized, the advantages cited fall into four categories: (1) with proper tooling, and proper arrangement of that tooling, resistance upsetting provides good production speed; (2) there is a minimum of material waste in finishing

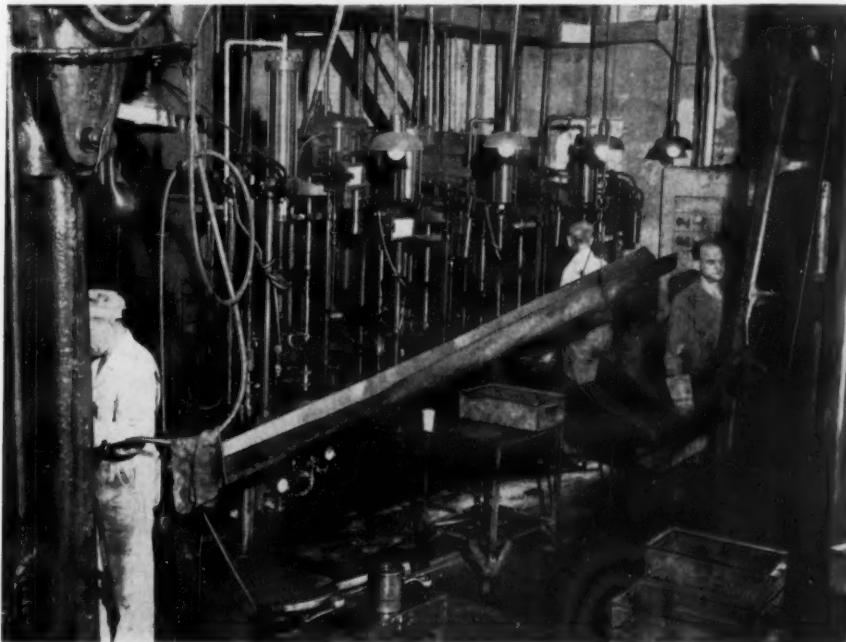
the upset parts; (3) production by upsetting provides one-piece rather than built-up parts; and (4) after upsetting, the grain flow in the metal is left in an optimum metallurgical condition.

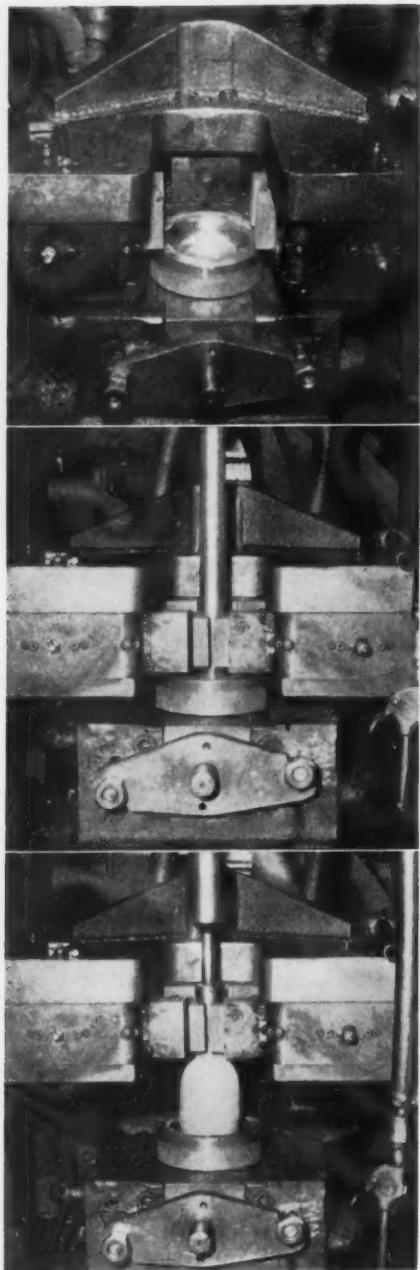
It was pointed out, of course, that these advantages are most obvious when the finished part conforms to a specific configuration. As a rule, this configuration consists of an enlarged diameter or cross-sectional area at one end or at a desired location along the longitudinal axis of the part. This enlarged diameter or cross-sectional area, the result of the metal

bulge produced during upsetting, can be used "as is" or can be machined or forged into the desired shape.

The parts now in production at Thompson Products follow this general configuration. They include engine valves in a wide variety of sizes, hydraulic pistons varying from very large to very small, and many various upset end fittings for tubular structures such as aircraft engine mounts, aircraft fuselage components, and so on. Also, the wide versatility of the upsetting machines makes it possible to produce many special parts in small

Fig. 1—Typical machine layout for upset production of engine valves. The four vertical upsetting machines in the background, operated by a single employee, produce the raw upsets. These are then fed through a short trough to the first forging hammer (at far right). After this first hit, the valves proceed via a second trough to the hammer at far left where the second hit is accomplished. Thus, three employees keep four upsetting machines and two forging hammers constantly busy.





lots that fall within configuration requirements. Engine seats and gear blanks, first upset and then forged integral with the shaft, are representative of the latter.

Another line of production on the upswing at Thompson Products is based entirely upon the results of company research and development. This is the upsetting of thin-walled tube ends into heavier end sections which are subsequently machined or forged into the desired integral tube end fitting. This development holds forth much promise to the aircraft industry and to other in-

Fig. 2—(Top) Scissor block arrangement on a Thompson Products' vertical upsetting machine. Here the workpiece clamps are open and the bottom die into which the metal is upset is visible. (Center) Here the workpiece has been placed in the scissor block clamps preparatory to upsetting. Note close spacing between scissor block clamps and bottom die. (Bottom) Here the upset nears completion. Note how scissor block mechanism has moved away from lower die to provide room for the upset bulge. This scissor block movement is used to control the contours of the upset portion.

dustries where tubular structures are commonly used. In the past, the thinned-walled tubing composing these structures has had to be fitted with separate end fittings. Now, using the new Thompson Products-developed upsetting technique, the end fittings are upset from the tube material itself, and thus are an integral section of the tube. Possibilities along this line are almost unlimited, and already many critical tubular structures for aircraft are being produced using this technique.

Fig. 3—Immediately after its removal from the resistance upsetting machine, and while still white hot, the upset is placed in a forging hammer for final shaping.

The metals most commonly used for these upset parts include the 3140 and 4340 chrome molybdenum steels and 2112, 431 and 4400 stainless steels. At the present time extensive research is being conducted in the upsetting of the stronger aluminum alloys, mainly 14ST6, and in the upsetting of titanium. It has been found that both will upset successfully under controlled conditions, but company engineers admit that additional research is required along this line.

The resistance upsetting machines in use (see Fig. 1) are company-designed, vary from 75 to 500 KVA in size, and will accept bar or tube stock up to 134 in. in length before upsetting and in diameters ranging from 0.31 to 5 inches. The minimum stock area that can be successfully upset is 0.08 square inch; the maximum, 9.62 square inches. Other machines now on the design board or being built will enlarge this range of capacities a considerable extent.

All the machines are built for vertical operation; that is, the bar or tube stock to be upset is plac-



ed in the machine in a vertical position. This prevents sagging of the hot plastic metal between the electrodes and produces very uniform upset cross sections. With present equipment, the upset must be accomplished at or near the end of the work, but a machine now under development will be able to produce upsets at any desired point along the rod or tube being used. To increase the length of the upset parts, this machine is being designed to accept work in the horizontal position.

Thompson Product engineers credit the success of the vertical resistance upsetting machines they are using to the company-designed and developed "scissor block"

which clamps the work in place and acts as one contact electrode. The views in Fig. 2 show clearly how this "scissor block" (a company name for the mechanism) works. The top view shows the sliding contacts of the scissor block open, revealing the cup-shaped bottom die used for upsetting the particular part shown in the three views. This bottom die is changeable and differs in shape according to the required shape of the upset. The bottom die serves also as the second contact electrode.

The center view of Fig. 2 shows a bar stock workpiece inserted in the upsetting machine and clamped in place by the pneumatically op-

erated scissor block jaws. This workpiece completes the electrical circuit between the scissor block electrodes and the bottom die. The upper end of the workpiece is butted against a hydraulic ram which pushes the workpiece downward into the upsetting bottom die as the operation progresses. A minimum of space (about $\frac{1}{8}$ in.) separates the scissor block jaws and the bottom die at this stage of the operation.

The bottom view of Fig. 2 shows the operation as it nears completion. Note that almost the entire length of the workpiece has been shoved into the upset portion by the ram to produce a large upset.

Fig. 4—Three of the several Homo Electric Furnaces used at Thompson Products for final heat treatment of upset parts.



Fig. 5—Upset thin-walled tubes produced for aircraft installation. One end of each tube is upset and then necked down by swaging. The other end of the tube is upset into heavier wall section for use as an integral end fitting.

which will be subsequently forged into a rather massive engine part. Note also how the scissor block along with the clamping jaws has moved upward to make room for the upset bulge.

William E. Achor, chief engineer at Thompson Products, says that the design and operation of the scissor block mechanism is largely responsible for the company's success in producing critically dimensioned upset parts. As the scissor block clamps follow the progress of the upset, moving away from the bottom die to provide room for the upset portion of the workpiece, the hydraulic ram forces the workpiece through the scissor block clamps. While the scissor block clamps are tight enough to maintain a good electrical contact, the friction between the workpiece and the clamps is easily overcome by ram pressure. The speed at which the scissor block clamps move away from the bottom die during upsetting can be adjusted according to the desired diameter or cross-sectional area of the upset portion.

The value of this mechanism in producing an evenly proportioned upset is clearly evident. The only part of the workpiece heated is that portion which closes the electrical circuit between the scissor block clamps and the bottom die. Thus, all metal sufficiently hot and plastic to upset under the pressure used



is confined in this short space. By keeping this space confined to the upset portion of the workpiece at all times, even as the upset grows larger and the scissor block clamps move away from the bottom die, and also due to the fact that all machines employing this scissor block mechanism handle the work in a vertical position, there is no chance for sagging or lapping of the work as the upset progresses.

Figure 3 shows the same part in a forging hammer immediately after it has been removed from the resistance upsetting machine. The upset portion is still white hot. A few blows from the forging hammer will shape the upset into a bottom hammer die of the required diameter.

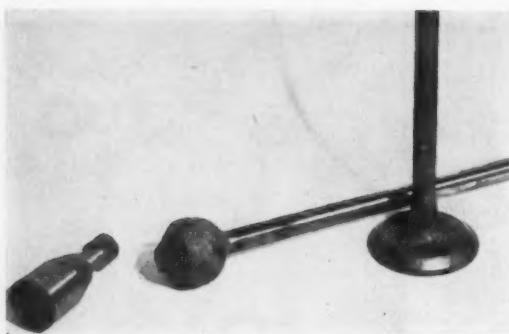


Fig. 7—(Right) An engine valve produced by resistance upsetting and forging; (center) the upset from which the valve was forged; (left) an end fitting produced by upsetting and then piercing.

ter and depth. A minimum of finish machining, along with a minimum of material waste, will produce the required part.

While forging is generally used to give a rough shape to the upset portion of the workpiece, this is not always necessary. Figure 9 shows an upset part along with the final part after machining directly from the upset portion.

The technique employed to upset thin-walled tube ends into heavier end fitting sections parallels the above, although more critical control must be exercised due to the tubular shape of the workpiece. In upsetting, about one-third of the tube metal forms inward and two-thirds outward; however, due to the differences in diameters involved, the net result is a very even upset around the periphery of the tube. This is clearly shown in Figure 10.

Figure 5 shows aircraft tubular parts being produced for Ryan Aeronautical Company. These thin-walled tube sections were first upset on one end and then the upset metal was swaged inward to form a heavy inward-tapering end. Next, the tube was remounted in the resistance upsetting machine and the opposite end upset into a heavy rim and wall section about $\frac{3}{4}$ in. thick and extending backward about 1 in. along the tube. Although the exact information was not available, it is quite evident that this heavy upset portion can be machined into a flange, drilled, or otherwise worked into any type of end fitting required.

According to Thompson Products engineers, one advantage of the resistance upset process is the optimum metal grain flow obtained in

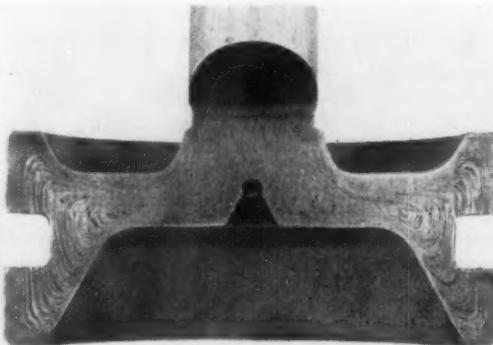


Fig. 6—Metal flow lines produced by upsetting bar stock into a hydraulic piston. Note continuity of flow lines except where they have been cut by final machining operations.

Fig. 8—Three stages in the production of a hydraulic piston by upsetting: (right) the upset from heavy-walled tubing; (center) the piston head after the upset is forged; (left) the finished piston after final machining, threading and drilling (all are cutaway views).



the upset portion. This grain flow follows the general contours of the upset in an unending pattern which, according to many metallurgists, results in greater strength and improved metallurgical properties. A typical grain flow pattern is clearly evident in Fig. 6, the head of a hydraulic piston produced by upsetting and then sectioned and etched to bring out the grain flow. Note the continuity of the grain flow lines except where they have been cut by machine operations performed after the upsetting operation was completed.

Thompson Products research engineers are fully convinced that production by resistance upsetting has a brilliant future. Several resistance upsetting machines now on the design board will accomplish jobs beyond the scope of current equipment. One of these machines is being designed to produce heavy upset end fittings as an integral part of structural shapes, such as an "I"

beam; another machine in the offing will produce upsets midway between the ends on these structural shapes. Still another machine, although as yet only an "engineer's dream," will accept huge, integrally stiffened airplane skin sections and then produce a series of upsets in a line across the integral stiffeners to act as attachment fittings for the purpose of mounting the skin section to the airframe, or as anchor points for mounting other fuselage members.

William Achor emphasizes, however, that one of the outstanding advantages of upset production is the potential for material saving. When a part is machined from solid stock, it is usually necessary to select a piece of stock equalling the overall dimensions of the part. The excess material is then machined away and becomes waste. In upset production, the diameter of the raw stock equals the smallest diameter of the fin-



Fig. 9—Typical part (left) machined directly from upset (right).



Fig. 10—Upset thin-walled tube ends—smallest (1/2-in. o.d. 1/16-in. wall) and largest (5-in. o.d. 1/8-in. wall) produced to date. The upset portions of thin-walled tubes are subsequently machined into integral end fittings.

ished part. Overall dimensions of the finished part are then obtained

by upset extrusion at the precise place where greater dimensions are required. Final machining then becomes a finishing operation with the result that very little waste of material is involved.

JIGMIL Technique Saves Time on General Machine Work

THROUGH the use of two DeVlieg Model 4B JIGMILS, King Machine Tool Division plant of American Steel Foundries is now obtaining not only greater production but also more accurately machined parts than ever before. Initially installed for precision boring operations required on the feed gear housings for the well known King vertical boring and turning machines, these JIGMILS have been pressed into service on a variety of other parts that require precision milling and drilling as well as boring operations. Like other users of JIGMILS, King has found that with the proper understanding of the "JIGMIL Technique" the machine can be exploited to the fullest possible extent and substantial economies with improved quality of work are obtained.

With previously used methods of machining the cast iron feed gear housings which included a considerable amount of unproductive time allotted for fixture mounting, alignment of the workpiece in relation to cutting tool and so on, the total time for machining each workpiece was anywhere from 8 to 9 hours. Frequently, even with the utmost care being observed in the boring of through-holes, the accuracy of alignment left a lot to be desired.

Now, as shown in Fig. 1, the casting need merely be finish machined on the face and one side to provide for location against locating and nesting blocks on the JIGMIL index table, securely clamped to the table itself, and the workpiece is ready for whatever machining that may be required. In the case of the particular casting shown, machining

time is now set at three hours and 20 minutes, and the requirements of precise accuracy are accomplished with ease. Altogether, twelve different size holes are required in this workpiece, necessitating the use of fifteen cutting tools. Just one example of accurate machining is found in the four 3.937 in. through-holes to accommodate shafts of the gear box which are bored to within a tolerance of 0.0005 inch.

Another interesting workpiece on which considerable setup and machining time has been saved is the cross brace shown on the JIGMIL index table in Fig. 2. In order to complete the machining of this workpiece, a total of 60 tool changes is required. From a previous total machining time of 18 hours, the required time now, through the use of the JIGMIL, has been reduced to 10 hours. Reliance on the "human element" to produce the close tolerances required on this workpiece is largely eliminated by the use of automatic functions—basic features of the JIGMIL design.

Positioning of the machine table and spin-

gle head in the horizontal and vertical planes is performed automatically through a sequenced electrical cycle. This important feature provides a means for controlling hole spacing in the workpiece to precise limits of accuracy through operation of a single push button.

For general-purpose work involving one-piece jobs at the King Division plant, extensive use is made of the DeVlieg Duplitrol system, a combination of end measure gage rods and micrometer heads which serve as a dependable and accurate means for controlling hole spacing. A set of two simple Duplitrol bars is provided for each job, and these bars serve as accurate and permanent spacing elements for duplicating the particular work at any time. The system permits change in product design without the expense of new tooling. When design changes

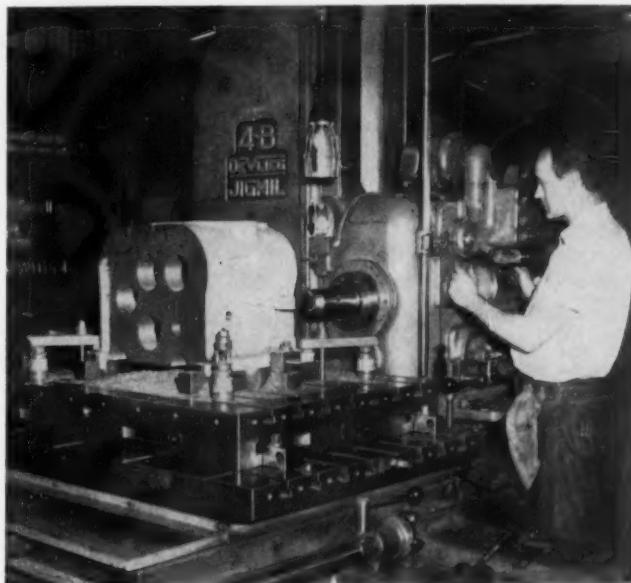


Fig. 1—Highly accurate boring of through-holes on gear housing for King vertical boring and turning machine is possible with the DeVlieg JIGMIL shown here.



Fig. 2 — Some sixty tool changes during the extremely accurate machining required on a cross brace for a King vertical boring and turning machine are performed easily and quickly on the DeVlieg JIGMIL.

occur, it is only necessary to provide two inexpensive end measuring bars to suit the hole spacing in the redesigned part.

To meet fully the problem of tool attachment and removal, the JIGMIL is provided with an automatic power tool lock. The desired tool is inserted to the full depth of the socket, a push button engages a

small torque motor and in 1½ seconds the tool is firmly located in place with exact uniformity. Operation of a second push button provides for ejecting the tool in the same amount of time.

The flexibility of the JIGMIL technique in its application to single-piece or multiple-production jigless boring eliminates more than 90 per cent of makeready time and expense. THE JIGMIL technique serves to make possible a new philosophy of highly accurate duplicate production beyond that possible with jigs by making product engineering fluid and releasing it from the economic restrictions of jig and fixture amortization.

Die Casting Film

A 16-mm. color and sound motion picture, entitled "Die Casting — How else would you make it?", has been released by the American Zinc Institute, 60 E. 42nd St., New York 17, N.Y. The film, which has a running time of 35 minutes, tells how designers are able to effect reduction in costs and shape a better product by taking full advantage of an important production

method. The film is informative and educational as it pictorially describes the die casting process. It vividly depicts the versatility and scope of the process by showing the tremendous range of shapes and sizes possible. It illustrates the widespread use of die castings in the home, the world of commerce, industry, transportation and every walk of life. Advantages and limitations of other ways of working metal are reviewed. A comprehen-

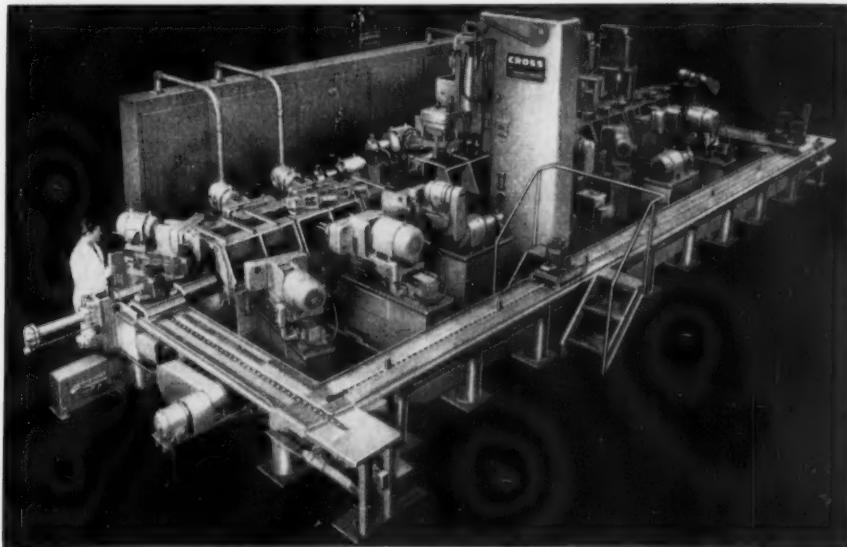
sive discussion and evaluation of die casting alloys—zinc, aluminum, magnesium and copper base—are included, pointing up the merit and special adaptability of each.

Detailed descriptions are given in the manufacture of certain parts to spotlight the unusual advantages provided by die casting. A case in point to show how their excellent surface finish facilitates the application of decorative coatings is unfolded as the camera follows a typical die cast automotive radiator grille, step by step, through buffering, detergent and spray rinse, acid etch bath, copper strike and build-up, nickel coat, to brilliant

and lustrous chromium plate. Design considerations are demonstrated by sample castings which indicate the ways in which designers have used the inherent advantages of the die casting process to achieve improved appearance, optimum functional properties, strength and compactness at lowest cost. Detailed examination of 45 outstanding die castings of all alloys is made with dramatic views to show how the design flexibility of the process responds to the demands of countless uses. The usefulness of the die casting process is limited almost solely by the properties of the materials that may be die cast.

Special Machine Tool for Transmission Cases

DESIGNED and built by The Cross Company of Detroit for use by one of the large automotive companies in machining transmission cases, the special machine tool shown herewith provides for automatic transfer of parts from station to station on pallet type work-holding fixtures. An integral conveyor returns the fixtures from the unloading to the loading stations. The machine has 21 stations: 1 for loading, 1 for unloading, 15 for machining and 4 are idle. A total of 107 operations is performed—84 of these are drilling, chamfering and reaming; 8 are spotfacing and counterboring; 4 are boring; 6 are tapping; and 5 are inspection. The machine stops automatically if critical tools are broken or improperly set for depth.



Multiplying Your Efforts

By ALFRED M. COOPER

In this article, the author takes a searching look into the techniques which distinguish good from bad supervision and makes recommendations for correcting bad situations.

MUCH of the value of any shop or office supervisor to his company depends on when and how he delegates authority to his assistants. In discussing this matter of delega-

No foreman ever appears to question the need for delegation of authority. All agree that a supervisor or executive cannot be successful until he learns to multiply himself by delegating details to others. But beyond that point, the opinions expressed (and all of these are based on their years of acquaintance with this problem) vary to a surprising degree. As a matter of fact, it soon develops there are bosses who favor delegation of authority in theory, yet practice it very little on the job.



"...there are bosses who favor delegation of authority in theory, yet practice it very little on the job."

tion with some thousands of supervisors (superintendents, general foremen, office managers, foremen, straw bosses) it becomes evident that there exists a big difference of opinion among experienced executives as to when and how authority should be delegated.

Most of us know one or more such supervisors. A boss of this type may have a number of subordinate supervisors reporting to him—people who should be taking care of the routine work of supervision, leaving the boss free to take care of the administrative angles of his job — but these subordinates have their hands tied. They can't make decisions of any sort until they check with the boss. This means that details of a most minor

nature must be acted on by the foreman (or other executive) until he is one of the busiest, and most harrassed, men in the plant. He gets things done, but *his* is a one-man organization, and he does everything himself. By the time he finishes handling detail he has neither time nor energy left for getting an occasional look at the overall administrative functions he is being paid to take care of.

The man who cannot wisely delegate authority limits his own capacity to get things done, and may limit his chances for advancement, as well. In essence, management is looking for future executives who know how to get the most out of a group of subordinate supervisors—bosses who can pool the brainpower of these assistants to advantage. The foreman who puts his faith in the old adage "If you want a thing done well, do it yourself," may come to be considered a poor risk for advancement to executive rank.

If a supervisor could delegate responsibility along with authority we would have fewer of these one-man departments. But every supervisor knows that, in the final analysis, responsibility for everything that happens in his bailiwick is going to come to rest on his shoulders alone, so far as management is concerned. This is, of course, as it should be. In other words, delegation of authority is always somewhat risky. *If the subordinate supervisor falls down on an assignment, the boss must assume the blame. But if subordinates do a good job, the boss gets a share of the credit.* These things have a way of balancing. With this in mind, the boss may

feel more inclined to take this risk.

The supervisor who hesitates to delegate is the one most frequently guilty of undercutting the authority of his subordinate supervisors. That is, this man, determined to keep every detail of the job in his own hands, may well short-circuit an assistant and, without consulting him,



"If the subordinate supervisor falls down on an assignment, the boss must assume the blame . . . if subordinates do a good job, the boss gets . . . credit."

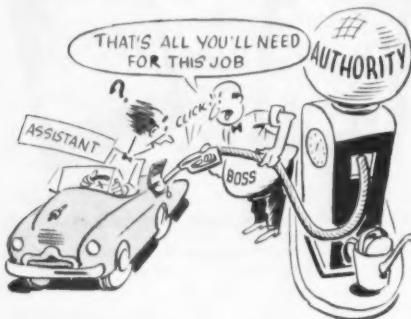
make a practice of giving orders directly to workmen—orders that may countermand those already issued by the assistant. If, in the past, this same thing has happened to the boss, he should have little difficulty understanding how the assistant feels about the situation in which he has been placed.

When undercutting is regularly practiced it is almost impossible for a high degree of employee morale to exist in that department. No one except the big boss knows where he stands. The workers cannot have faith in, nor respect for, their immediate supervisors. The junior supervisors, in turn, find themselves reduced to the status of messenger boys.

There are certain problems in

connection with delegation of authority that are common to all situations, and these should be considered before the supervisor can be sure he is handling this part of his job satisfactorily.

The first problem deals with the amount of authority it is wise to delegate in any instance. And as soon as this matter is considered it becomes evident that the solution depends on the type of assistants the supervisor has reporting to him.



"The boss' job is to decide . . . how much authority he may safely hand over to an assistant."

There are bosses who hesitate to delegate authority, but there are also assistants who hesitate to accept authority, particularly when this means they are to be held fully accountable for any errors they may commit. It becomes apparent that one type of assistant wants full authority to run his job, and is willing to stand or fall on the results he gets under such a free-hand setup.

But another type of assistant likes to check with the boss on every detail of his work before taking supervisory action, and will feel he is not being treated fairly if he has been discouraged in going to the

boss every time a decision is to be made. Particularly is this the case if he is later criticized for making a mistake in judgment.

In between these two extremes we find assistants who can be trusted with a certain amount of authority. *The boss' job is to decide, in any given instance, how much authority he may safely hand over to an assistant.*

Thus, it becomes obvious that for a particular boss there is a type of assistant who belongs in that organization and another type of subordinate supervisor who should be reporting to somebody else. If the boss is going to move very slowly in delegating authority, and if his assistants are of the type who like to check with the superior on everything, the boss is sitting pretty. But aggressive, independent supervisors are never going to be happy working for such a boss.

In discussing this problem, most executives and supervisors appear to feel that the best practical solution is to decide honestly how far they wish to go in delegating and then study each assistant and gradually increase each man's authority until it is felt he has reached his limit in this direction. And since both the boss and his subordinate supervisors must be in general agreement regarding these matters, it may become necessary to make some changes (probably transfers) in order that harmony may prevail.

In many plants, management is much interested regarding the type of second man that is being developed in any department. Obviously, delegation of authority has a lot to do with the development of the man

who is going to take the boss' place during vacations, and eventually succeed to this job when the boss is promoted. *Most executives appear to feel you get a better type of second man if he has become accustomed to exercising quite a bit of authority.* Conversely, the boss who refuses to delegate may be embarrassed when management asks him who is to take over his department in case of his promotion.

Now the second man must be prepared to make decisions that are sound, in terms of cost of production and worker morale. He has had little training along this line. Furthermore, this assistant probably will continue to report to the same boss, who is now to become, let us say, general foreman. And the degree to which the former second man now makes an acceptable foreman will have some bearing on the success of the boss in his new job.

Another problem is encountered when the boss is experimenting to determine just how much authority any assistant is capable of carrying. As the problem usually manifests itself, a situation arises in which the assistant has taken a stand in dealing with a workman and the case has not been handled to the boss' satisfaction. Should the boss now step in and straighten matters out, or should he keep hands off and let the assistant work out his own salvation?

Many supervisors believe that when an injustice has been done this should be corrected as soon as possible. These supervisors often state they would get the worker and the assistant together and thresh out their differences. Then they

would straighten out the matter, and also prevent repetition of such mistakes in the future.

But an equal or greater number of competent supervisors will not settle for the above solution. They contend that the boss should never interfere with a supervisory situation when this means an order of the assistant may have to be reversed and this fact is to be made known to a member of the working



"Most executives . . . feel you get a better type of second man if he has become accustomed to exercising . . . authority."

force. When corrective action is to be taken, the assistant should take care of this in his regular contacts with those reporting to him.

Supervisors also point out that when such cases are handled in the above fashion it often develops that the assistant was not at fault at all, and if the boss had "conducted an investigation," with the assistant on trial before those reporting to him, it would thereafter be more difficult for the assistant to do a good job in that department. And the boss has

not made a very good showing in dealing with this situation.

Superiors who have learned to multiply their efforts by delegating appear to expect subordinate supervisors to make occasional mistakes. Many bosses state they learned a lot about supervision by making



"... if you have access to production records you probably find his department is about on a par with that of another supervisor ... trying to keep on top of a crushing load of detail."

mistakes and then having to correct these errors. They appear to favor giving their assistants the same privilege of being wrong once in a while. Only thus, they contend, can really strong second men be developed in any department.

Many supervisors who are adept at delegating are frank in stating that they enjoy letting others do as much of their work as possible. And when you sit in the office of such a supervisor you find him relaxed, apparently with little to worry him, and with no stream of people rushing in and out, getting his O.K. on a score of details.

Once in a while this man's phone may ring, but for an hour this head man is discussing matters that are altogether foreign to the work go-

ing on just outside. Yet, if you have access to production records you probably find his department is about on a par with that of another supervisor who is beating his brains out trying to keep on top of a crushing load of detail.

Another problem in delegation also concerns the ability of the assistant to react favorably to responsibility. This situation develops when the assistant has been given sufficient authority to run his job, but finds he has trouble with certain individuals reporting to him. As often as not, in such a case, these workmen are skilled artisans who are older than the assistant, and who resent taking orders from a younger man. These workers are very valuable to the organization and earlier have reported directly to the head man.

Now they like to continue to come directly to this superior for suggestions. The question arises, what is the boss' responsibility in such a case as this? And what is the responsibility of the assistant supervisor concerned?

Discussion of this question by experienced supervisors usually brings out these points: There can be no objection to the department head continuing on a friendly personal basis with the older employees in his organization, provided he does not permit critical discussions of the work of the assistant to enter into these sessions. If the employees insist on bringing up matters pertaining to orders given by the assistant they must be told that their grievances must be taken up with the assistant. Anything less than this constitutes short-circuiting and

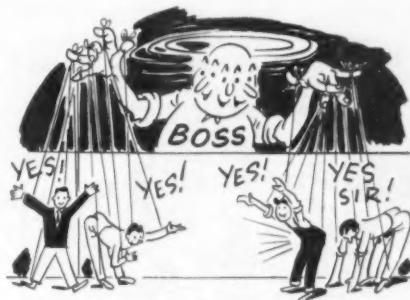
makes it almost impossible for the assistant to do an adequate job.

When this has been done, however, most supervisors appear to feel that the assistant must thereafter stand on his own feet and develop working relationships with all those reporting to him. In the case of the older subordinates he may find it necessary to defer to their superior experience and thus win their cooperation. In any event, the assistant must then get results or be replaced by someone who can. Nothing in this situation prevents the assistant from consulting with his boss as often as he considers this advisable, but the boss refuses to "carry" a weak assistant who cannot win the cooperation of his subordinates.

From the assistant's viewpoint, this stand-on-your-own-feet dictum is usually well received, particularly when it is accompanied by cor-

the back once in a while if they handle a difficult situation in a satisfactory manner. Apparently no assistant likes to feel that his boss is "carrying" him at the expense of the good of the organization.

Most assistants appear not to object to having their subordinates



"He had never favored delegating much authority . . . feeling he could better keep track of . . . his work if he handled things himself."



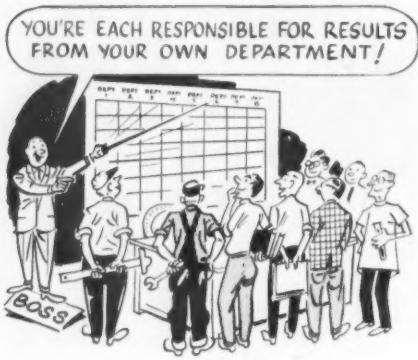
"Most assistants appear not to object to having their subordinates deal directly with the boss, but . . . prefer having the workman check with them before doing so."

responding fairness on the part of the superior. Most assistants appear to react well to additional responsibility, many of them stipulating only that they like to get a pat on

deal directly with the boss, but many of them state they much prefer having the workman check with them before so doing. Also, these intermediate men often argue that this should be a one-way thoroughfare. That is, the boss should not initiate contacts with the workmen, but deal with them, whenever possible, through the subordinate supervisors. Thus, any worker has the right to carry a grievance to the head man, but this boss does not seek out workmen and, of course, never sounds them out for grievances.

Two examples from life may serve to point up extremes in this matter of delegating authority. In the first instance, an executive had risen to a position of importance in a large manufacturing corporation.

He was a hard worker, conscientious, and technically qualified for his job. *He had never favored delegating much authority to his lieutenants, feeling he could better keep track of all the angles of his work if he handled things himself.* He loved detail work and was a stickler for perfection in small matters.



... all division heads ... were to have full authority to run their jobs."

His assistants were expected to check with him before going ahead on anything. These junior executives were chosen for their ability to subordinate themselves to the head man. He encouraged on display of initiative.

This executive worked early and late. He got results. But there always existed confusion in his department, based on his unconscious but everlasting short-circuiting of his assistants. His division was strictly a one-man organization. He was a kindly man and his subordinates, workmen and supervisors alike, loved him. But neither they nor management had a great deal of respect for him. He held the new

job for a couple of years and then was regretfully replaced.

The executive representing the other extreme was an administrator par excellence. He had developed an industrywide reputation as a superb organizer, and was known as a developer of outstanding executives. Another large concern, manufacturing a line of products with which he was totally unfamiliar, heard of his success and, after investigating, offered him the position of general manager at double the salary he was getting. After considerable study, and probably with some misgiving, he accepted the offer.

In telling about his experience on the new job, the executive said, "I had eight division heads reporting directly to me. Each man was a wizard in his line; in each instance I knew next to nothing of the work going on in the department.

"I called the division heads together and put my cards on the table. I told them I was going to run the plant; I had no intention of acting the part of a figurehead. Then I explained that I knew little of the work in their departments, and because I was going to concentrate on the administrative end of my job I probably never would become thoroughly acquainted with the details of their work.

"Finally, I put it up to all division heads flatly. They were to have full authority to run their jobs. They were experts and knew what to do to keep their departments running at highest efficiency. Thereafter, I would hold each executive responsible for results. So long as he got results he would have a free

hand and would receive full credit with my superiors for everything he accomplished. If he fell down on the job he would be replaced by someone who could produce satisfactorily under this setup.

"The division heads got the idea and I never had any trouble with any of them. I was able to make a good showing in running a plant in which the day-to-day routine of manufacturing was, and still is, something of a mystery to me." This executive, during the ten years preceding his retirement, added greatly to his earlier enviable reputation, both as a successful administrator and as a developer of top-flight executives, after thus changing jobs.

Most executives and supervisors classify somewhere between the two extreme examples cited above. The extent to which they will delegate authority to subordinates will depend on how much thought they have given to this division of executive responsibility and, as has been pointed out, on the type of assistants they have reporting to them.

It would seem that a supervisor must possess a degree of steadfastness if he is to put full trust in his subordinates, and at the same time fully trust his own judgment as a selector and developer of good assistants.

In any case, if the superior has selected an assistant supervisor, trained him, and informed him he is to have complete authority to run his job, then any reversal or limitation of this policy should be made in private, and never with the knowledge of the working force. The boss should go all the way in delegating

or he should let the assistant know exactly what the circumstances must be under which he, the boss, is to be consulted before action is taken.

The head man must delegate authority wisely, in terms of each assistant's ability to share the load. Only thus can the boss be sure he is doing his utmost to conserve his own energies, and thereby multiplying himself and his ability to get things done. This is the type of man management likes to shove ahead into top echelon jobs.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.



How to Machine Magnetic Ingot Iron

By W. E. MCFEE*

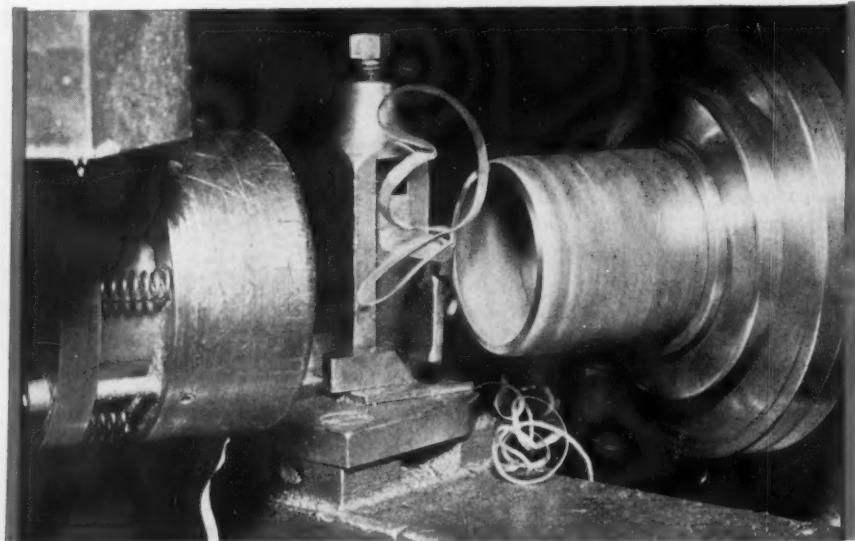
A summary of helpful suggestions based on actual shop experience.

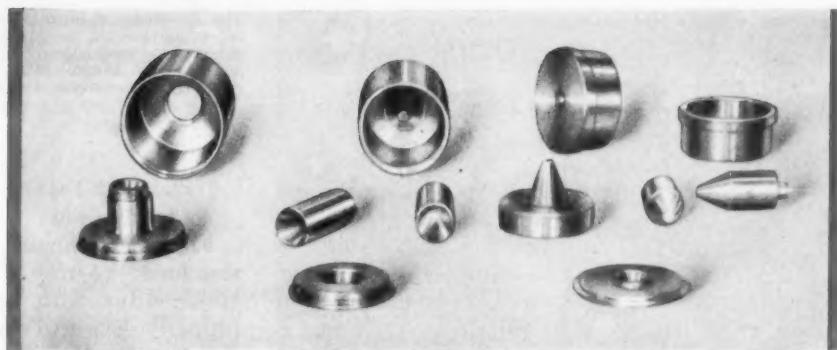
MORE and more shops are being called upon to machine magnetic ingot iron and, without a practical working knowledge of this useful material, are running into trouble. As a matter of description, mag-

netic ingot iron is a special highly refined iron, supplied as bar stock as well as heavy sheet and strip. It has a wide field of magnetic and electrical uses ranging from huge magnetic cores to telephone and telegraph wires. Its high saturation value and unusually good demag-

* Supervisor, Product Information Service, Armco Steel Corporation.

Seamless motor yoke after edge trimming. Properly ground cutting tools are essential for good machining results on magnetic ingot iron.





These precision parts for magnetic aircraft uses were machined from cold-drawn magnetic ingot iron bar stock. Proper tool design was important in the machining of these parts.

netization characteristic make it especially suited to d.c. devices.

Typical Analysis

Element	Per Cent
Carbon	.015
Manganese	.028
Phosphorus	.005
Sulfur	.025
Silicon	.003
Total	.076

Machining Recommendations

Magnetic ingot iron can be readily machined when correct tool an-

gles are maintained. Tools must be ground to sharper cutting angles than required for carbon steel. The uniform purity of magnetic ingot iron makes it ductile and tough, which explains why it is necessary to use extremely sharp tools to cut the metal cleanly. More metal can be removed and a better finish assured by using relatively fine feeds and deep cuts with the tool angles recommended in this article. Tools should be clamped tightly and the unsupported cutting ends kept as close to the tool post as possible for

Table I—Comparison of Tool Angles for Stock with and without Scale

TOOL ANGLES	NO MILL SCALE (Degrees)	WITH MILL SCALE (Degrees)
Backslope	15	15
Sideslope	28 - 32	18 - 20
Front Clearance	8 - 10	6 - 8
Side Clearance	8 - 10	6 - 8
Cutting Angle	75	75
Relief Angle	15	15
Tip Radius	1/32 - 1/16	1/32 - 1/16

How to Machine Magnetic Ingot Iron

By W. E. McFEE*

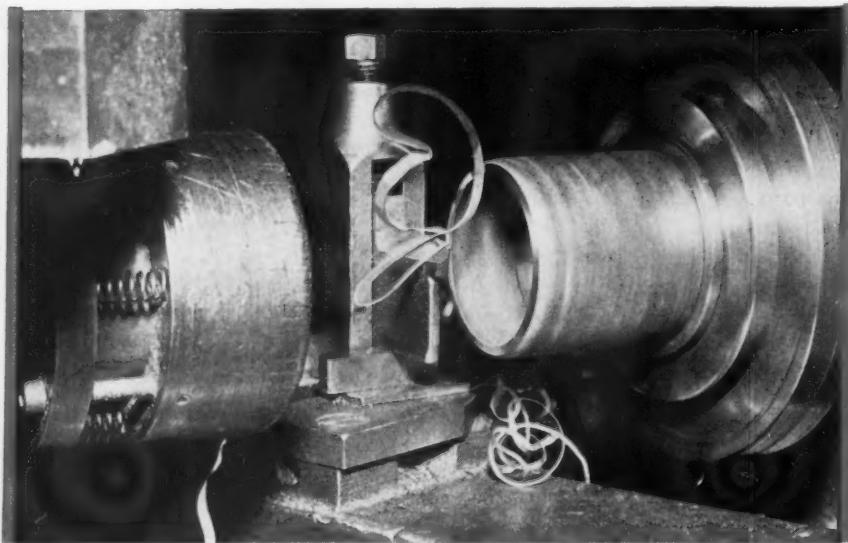
A summary of helpful suggestions based on actual shop experience.

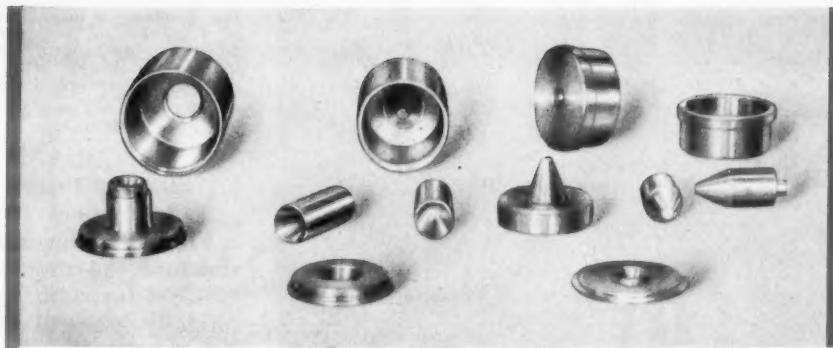
MORE and more shops are being called upon to machine magnetic ingot iron and, without a practical working knowledge of this useful material, are running into trouble. As a matter of description, mag-

netic ingot iron is a special highly refined iron, supplied as bar stock as well as heavy sheet and strip. It has a wide field of magnetic and electrical uses ranging from huge magnetic cores to telephone and telegraph wires. Its high saturation value and unusually good demag-

* Supervisor, Product Information Service, Armco Steel Corporation.

Seamless motor yoke after edge trimming. Properly ground cutting tools are essential for good machining results on magnetic ingot iron.





These precision parts for magnetic aircraft uses were machined from cold-drawn magnetic ingot iron bar stock. Proper tool design was important in the machining of these parts.

netization characteristic make it especially suited to d.c. devices.

Typical Analysis

Element	Per Cent
Carbon	.015
Manganese	.028
Phosphorus	.005
Sulfur	.025
Silicon	.003
Total	.076

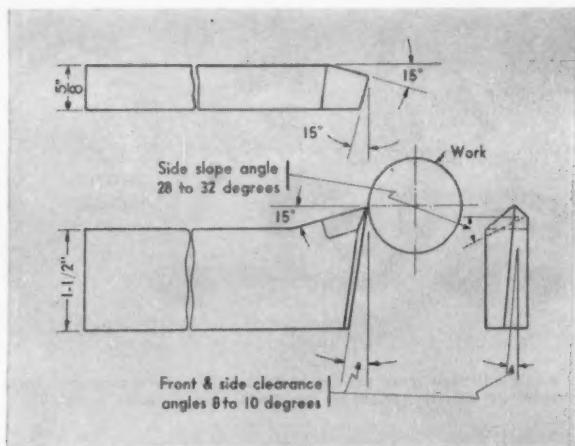
Machining Recommendations

Magnetic ingot iron can be readily machined when correct tool an-

gles are maintained. Tools must be ground to sharper cutting angles than required for carbon steel. The uniform purity of magnetic ingot iron makes it ductile and tough, which explains why it is necessary to use extremely sharp tools to cut the metal cleanly. More metal can be removed and a better finish assured by using relatively fine feeds and deep cuts with the tool angles recommended in this article. Tools should be clamped tightly and the unsupported cutting ends kept as close to the tool post as possible for

Table I—Comparison of Tool Angles for Stock with and without Scale

TOOL ANGLES	NO MILL SCALE (Degrees)	WITH MILL SCALE (Degrees)
Backslope	15	15
Sideslope	28 - 32	18 - 20
Front Clearance	8 - 10	6 - 8
Side Clearance	8 - 10	6 - 8
Cutting Angle	75	75
Relief Angle	15	15
Tip Radius	1/32 - 1/16	1/32 - 1/16



utmost rigidity. Considering the physical properties of magnetic ingot iron, cutting pressures are low when the correct tool angles are used.

Figures 1 to 8 herewith are presented as guides to correct tool angles, although in some cases it may be necessary to improvise because of special conditions. One such case is where the finish is secondary and less sideslope combined with a coarse feed will break up the chips. High speed machining, of course, requires the use of suitable coolants.

Fig. 1—Drawing showing standard 15-degree toolholder with bit properly ground for lathe work on magnetic ingot iron.

Fig. 2—Where a forged tool is employed in machining magnetic ingot iron, the tool angles shown in this drawing are recommended.

Standard Tool Applications

Figure 1 shows a standard 15-degree toolholder with bit properly ground for lathe work on magnetic ingot iron. Table I gives a comparison of the tool angles for stock with and without scale. The important factor to be observed in this case is that the cutting tip is at the same height as

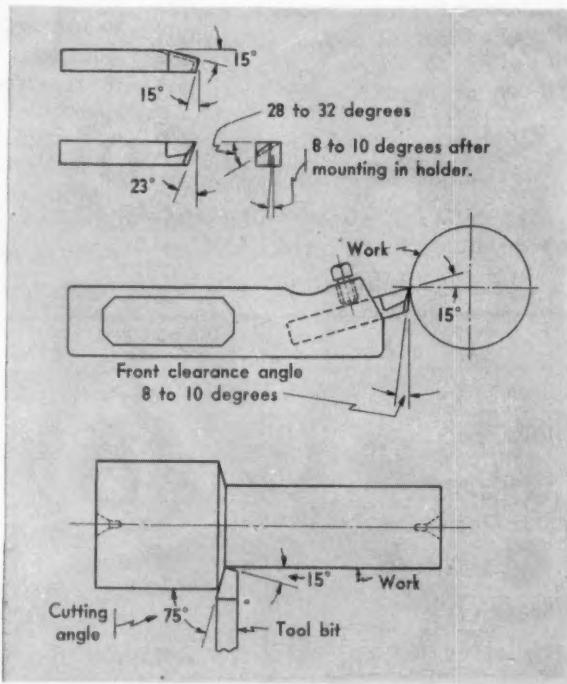


Fig. 3—Best results are obtained in cutting off magnetic ingot iron by using a well-supported cut-off with the cutting edge at the same height as the spindle center, as shown herewith.

the spindle center.

Where a forged tool is employed, the tool angles shown in Fig. 2 are recommended. For shaper and planer work, the front and side clearance angles are reduced to 4 degrees, otherwise the same angles shown in Figs. 1 and 2 are used.

The best and most consistent results are obtained in cutting-off operations on magnetic ingot iron by using a well-supported cut-off tool with the cutting edge at the same height as the spindle center, as shown in Fig. 3. Mineral oil with a viscosity of 70 to 80 with 1 to 1½ per cent sulfur and 5 per cent fat should be used as a cutting compound. Should scale be heavy on hot-rolled stock the backslope angle must be decreased (see Table II). Fine feeds should be used for this machining operation. Surface

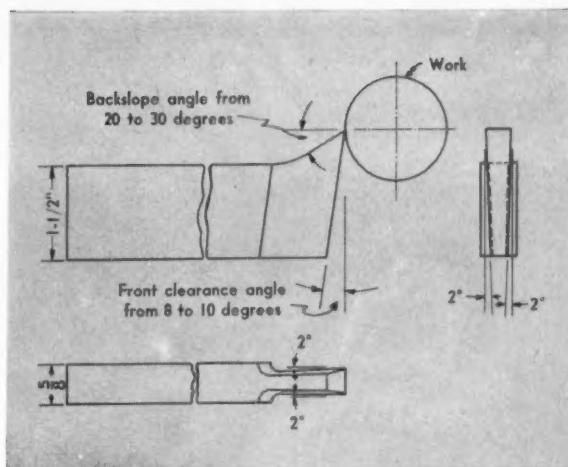
speeds of 100 to 150 feet per minute with rigid tooling are customary, although these may be stepped up somewhat for special conditions.

Milling Cutters and Saws

Smooth finishes can be obtained, even with very deep cuts, by using high helix angle milling cutters of 45 to 52 degrees. The front hook or rake angle undercut should be 30 degrees instead of the usual 12 degrees (see Fig. 4). Surface speeds from 80 to 150 feet per minute are satisfactory, with the lower speeds being used for the roughing opera-

Table II—Comparison of Cut-off Tool Angles for Stock with and without Scale

TOOL ANGLES (CUT-OFF)	NO MILL SCALE (Degrees)	SCALE (Degrees)
Backslope	30	20
Front Clearance	10 - 12	7 - 9
Side Clearance	1 - 2	1 - 2
Relief Angle	1 - 2	1 - 2



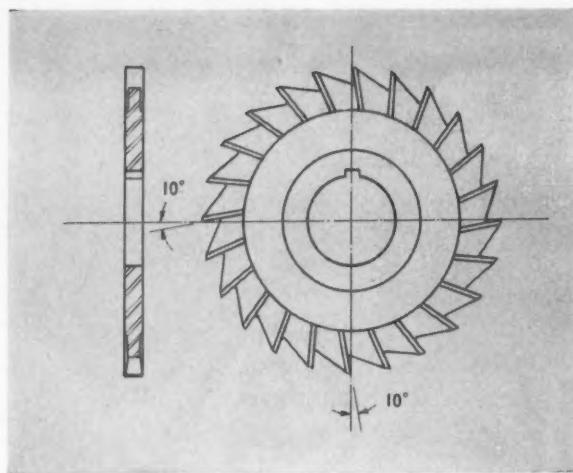


Fig. 5—Drawing showing type of milling saw best designed for machining magnetic ingot iron.

tions and the higher speeds for finishing. Feeds also may range from $\frac{3}{4}$ to $1\frac{1}{4}$ inches per minute. Proper coolants are required in all cases.

Fig. 5 shows the type of milling saw best designed for machining magnetic ingot iron. In use, the saw should be flooded with a suitable coolant to carry away the chips and to prevent burning the teeth. The 10-degree front hook illustrated in Fig. 4 makes a clean, smooth cut. It does the best and smoothest job when at least two teeth are in the working area when machining.

Drilling

Light feeds from 0.002 to 0.004 inch

Fig. 4—In using a high helix angle cutter on magnetic ingot iron, the front hook or rake angle undercut should be 30 degrees, as shown in this drawing.

per revolution are recommended for drilling operations on magnetic ingot iron. Drills should be ground as shown in Fig. 6. Greater clearance is needed than for drilling carbon steel. Lips should be made of equal length with an included tip angle of 100 degrees for best results. Normal cutting speed is 80 feet per minute. When the drill is cutting properly, the chips will come out in long curls rather than in crumbly chips. End mills and counterbores require more clearance, and cutting oils should be used for this work.

Tapping

For tapping operations on magnetic ingot iron, a larger than standard drill should be used since the

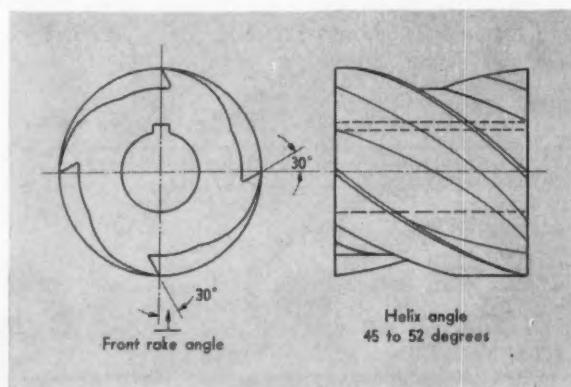
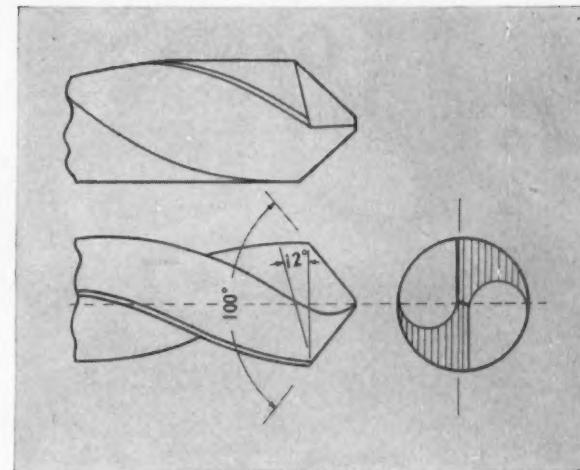


Fig. 6—Drills used on magnetic ingot iron should be ground as shown herewith.

tap tends to form a full thread because of the plastic flow of the ductile iron. In this manner, tap breakage will be reduced and a perfect thread will be formed. Taps should be ground as indicated in Fig. 7 for smoother, more uniform threads with less effort.

In tapping magnetic ingot iron either white lead or lard oil can be used as a lubricant, both giving good results. Some of the heavier-bodied oils are also suitable.

When threading the outside of rods, a 3 or 4-cutter chaser die with approximately a 20-degree straight rake should be used and operated at 35 feet per minute. Where drilling is followed by a tapping operation, it is well to make sure that the hole is free of chips to avoid tap breakage. A two-tooth gun-type



spiral-pointed tap is effective for machine tapping at speeds of 20 feet per minute.

Automatic Screw Machines

The principles shown in Fig. 8 have been successfully used in making setups for automatic screw machines and form tools in connection with machining magnetic ingot iron. If long shavings foul the machine, the backslope and sideslope angles should be cut down or chip-breakers used. Fine feeds of 0.001 to 0.003 inch per revolution work best.

The following cutting speeds for various automatic screw machine operations are based on actual runs:

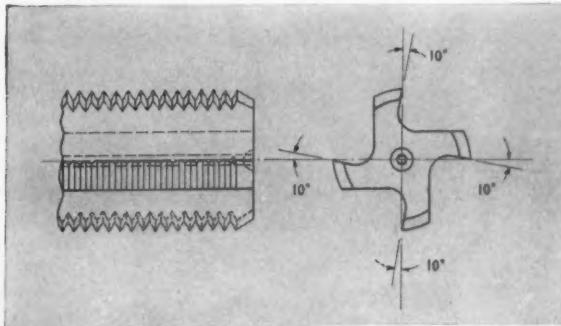


Fig. 7 — For producing smoother, more uniform threads in magnetic ingot iron, taps should be ground as indicated herewith.

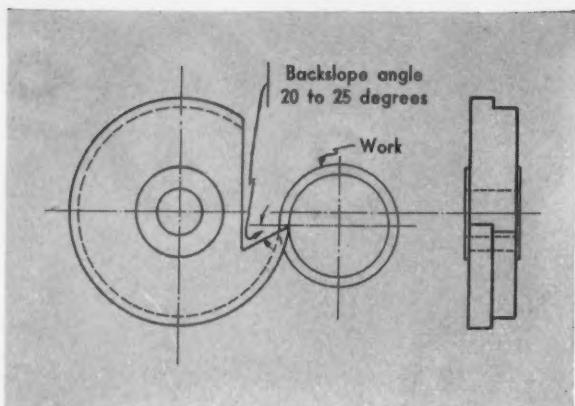


Fig. 8—The principles shown in this drawing have been successfully used in making setups for automatic screw machines and form tools in connection with machining magnetic ingot iron.

1. Outside turning Box tools with a surface speed of 100 f.p.m. are recommended.
2. Rod cutting. When cutting off rods to specified lengths, excellent results can be obtained with surface speeds of 150 f.p.m. For absolutely flat ends, the parts should be shaved after cutting to length.

Welding Alcoa Aluminum. Published by Aluminum Company of America, 733 Alcoa Bldg., Pittsburgh 19, Pa. 176 pages. Illustrated. Heavy paper covers.

This book describes the latest development in the science of welding aluminum. Illustrations and drawings are coupled with the comprehensive text to illustrate all the practical methods for welding aluminum, which include torch welding, arc welding, resistance welding and pressure welding. Special attention is given to the selection of welding method, performance of welds, welding of aluminum castings and control of welding quality. After an introductory section that explains characteristics of welded joints, the book describes how to se-

lect the best method for welding aluminum, including the factors that influence aluminum alloy selection for a welded structure. Chapters are included on the following welding methods: inert-gas shielded-metal arc welding with both tungsten and consumable electrodes; spot and seam welding; flash welding; metal arc, carbon arc, atomic hydrogen and gas welding. Welding of aluminum castings is also explained, followed by a complete discussion of pressure welding methods and applications. The final section of the book is made up of 32 comprehensive tables giving important data on welding aluminum, including such important information as the physical properties of Alcoa alloys, alloy compositions of certain type welds.

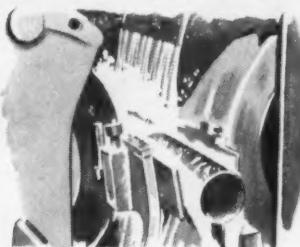
The cutter should be flooded with a suitable coolant in all kinds of screw machine work.

The form cutter illustrated in Fig. 8

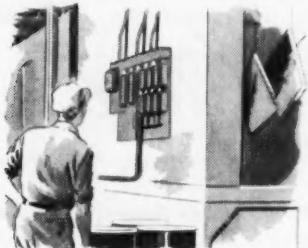
New S.E.C.O. is Tops For These Operations



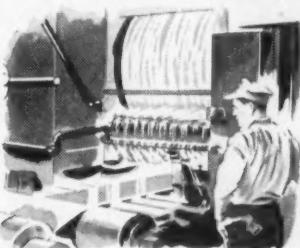
CUTTING WITH NEW S.E.C.O. Tools stay cool—require less frequent grinding. Finishes are uniformly good.



GRINDING WITH NEW S.E.C.O. Surface finishes are good. Loading and glazing of wheel are reduced—wheel life is prolonged.



WASHING WITH NEW S.E.C.O. Thorough removal of grease and dirt provides clean surfaces for smooth, long-lasting finishes.



ROLLING WITH NEW S.E.C.O. Rolls stay clean. You get maximum reductions and low power consumption.

New Sunoco Emulsifying Cutting Oil increases production, cuts operating costs. Its high machining efficiency permits uniformly good finishes, prolongs tool life. Its high detergency and purity keep tools, parts and machines clean. Its excellent mixing qualities permit its use in cold, hard or hot water. Test New S.E.C.O. in your own plant. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. MM-11.

**INDUSTRIAL PRODUCTS DEPARTMENT
SUN OIL COMPANY**

PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL
Refiners of famous High-Test Blue Sunoco Gasoline





It pays you to use

BALANCED *Action* TAPS

It takes care and skill to make taps that perform with BALANCED ACTION. Only Winter makes them.

It pays you to use BALANCED ACTION taps because of their accuracy—their longer life—and your saving in scrap losses.



UNIFORM
FLUTE CONTOURS



PRECISION CHIP
DRIVER CONTOURS

ALWAYS AT YOUR SERVICE

Your local Industrial Supply Distributor carries a complete stock of WINTER Balanced Action Taps.



WINTER

WINTER BROTHERS COMPANY

Rochester, Michigan, U.S.A. Distributors in principal cities.
Branches in New York • Detroit • Chicago • Dallas
San Francisco • Los Angeles

Division of National Twist Drill & Tool Co.



ACCURATE AND
CONCENTRIC CHAMFERS



Cutting Edges That *Cut Costs*

Once you start using National Tools—whether for roughing or finishing, for production or for accuracy—you'll stay with them. Their fine cutting edges give you the better work that cuts your costs.

NATIONAL TWIST DRILL AND TOOL COMPANY

Rochester, Michigan, U.S.A.

Distributors in principal cities.

Factory branches: New York • Detroit
Chicago • Dallas • San Francisco
Los Angeles



CALL YOUR INDUSTRIAL SUPPLY
DISTRIBUTOR for all your staple industrial
needs, including NATIONAL Twist Drills, Ream-
ers, Counterbores, Milling Cutters, End Mills,
Hobs and Special Tools.

National



International Amphitheatre



36th National Metal Congress and Exposition

CHICAGO will be the 1954 host to the four participating societies who will cooperate in presenting the 36th National Metal Congress and Exposition which is to be held in the city October 30 to November 5, inclusive. The four societies are the American Society for Metals, American Welding Society, Institute of Metals Division of American Institute of Mining and Metallurgical Engineers, and the Society for Non-Destructive Testing.

The primary purpose of the Annual Metal Congress and Exposition is to bring together the experience, the knowledge and the means for a more effective use of metals in the making of products for civilian use and for the making of products that will ensure our defense against aggression and thus guarantee our security and liberty.

Exhibits

Over 400 nationally known firms engaged in either the production of metals, the treatment of metals, the fabrication of metals into component parts or products, or in rendering services to all of these fields will have exhibits. Six acres of floor space will be devoted to the showing of new products, new processes, new developments and new services being offered to American industry.

Technical Programs

The four sponsoring societies, through their scheduled seminars, lecture sessions, and meetings on technical subjects pertaining to metals production, treating and processing, will provide the National Metal Congress and Exposition visitors with daily opportunity to hear vital technical subjects discussed and analyzed by some of the world's leading engineers and teachers.

The American Society for Metals will hold its annual seminar on Saturday morning and afternoon, and Sunday morning and afternoon, October 30-31. Subject of the 1954 ASM seminar is

"**Imperfections and Impurities.**" Through the week of the Metal Congress, the American Society for Metals and the American Welding Society will hold morning, afternoon and evening technical meetings. The Institute of Metals Division, American Institute of Mining and Metallurgical Engineers, will hold daily and evening technical sessions Monday through Wednesday. The Society for Non-Destructive Testing will hold morning and afternoon sessions Monday through Friday.

ASM Metallographic Exhibit

The ninth Metallographic Exhibit of the American Society for Metals will be held at the National Metal Congress and Exposition in Chicago during the week of November 1-5, 1954. A large area within the International Amphitheatre, scene of the "Metal Show," has been reserved so that displays of the Metallographic Exhibit can be shown to best advantage. Work which has appeared in previous ASM Metallographic Exhibits is not acceptable.

Eleven classifications of micros are designated for the contest, including tool steels and tool materials; stainless and heat resisting steels; other steels and irons; aluminum, magnesium, beryllium, titanium and their alloys; copper, zinc, lead, nickel and their alloys; metals and alloys not otherwise classified; series showing transitions or changes during processing; surface phenomena; results by unconventional techniques (other than electron micrographs); slags, inclusions, refractories and cermets.

A committee of judges, appointed by the Metal Congress management, will award a first prize (medal and blue ribbon) to the best entry in each classification. Honorable mention with appropriate medal will be awarded to those closely approaching these winners. A Grand Prize (embossed certificate and \$100 cash) will be presented to the exhibitor whose entry is adjudged best in the show. The Grand Prize entry becomes the property of the American Society for Metals for preservation and display in the Society's National Headquarters.



President, 1953-54
J. B. Austin

Officers American Society for Metals



Treasurer, 1954-55
W. A. Pennington



President, 1954-55
George A. Roberts



Vice-President, 1954-55
A. O. Schaefer



Secretary, 1954-55
W. H. Eisenman

ASM Seminar on Impurities and Imperfections

Technical Sessions at Palmer House

Morning Session, October 30

Lattice Vacancies and Interstitials—By Harvey Brooks, Cruft Laboratory, Harvard University.
Dislocations—By J. C. Fisher, Metallurgy Research Department, General Electric Company, Schenectady, N. Y.
Grain Boundaries and Substructures—By R. W. Cahn, University of Birmingham, England, and Visiting Lecturer, Johns Hopkins University.

Afternoon Session, October 30

Effects on Crystal Growth—By Bruce Chalmers, Head of the Department of Metallurgy, Harvard University.
Effects on Diffusion—By David Lazarus, Department of Metallurgy, University of Illinois.
Effects on Transformations—By David Turnbull, Research Laboratories, General Electric Co., Schenectady, N. Y.

Morning Session, October 31

Effects on Mechanical Properties—By E. R. Parker, Chairman, Department of Minerals Technology, University of California.
Effects on Electrical Properties—By J. S. Koehler, Department of Metallurgy, University of Illinois.
Effects on Chemical Properties—By W. D. Robertson, Associate, Metallurgical Laboratory, Yale University.

Afternoon Session, October 31

Impurity Phenomena in Semi-Conductors—By J. A. Burton, Bell Telephone Laboratory, Murray Hill, N. J.
Effects on Dielectrics and Ionic Crystals—By R. J. Maurer, Department of Metallurgy, University of Illinois.
Radiation Damage—By Frederick Seitz, Research Professor, University of Illinois.

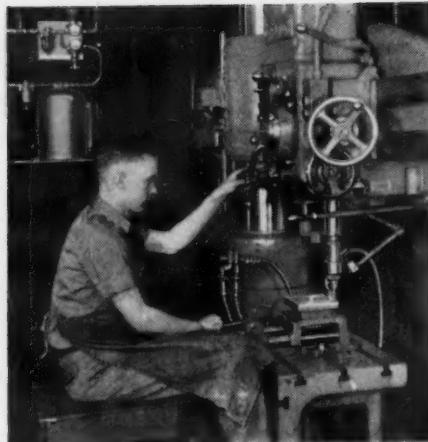
Norgren

Spray-Lube

System

ON RADIAL DRILL TAPPING HOLES IN 1 $\frac{1}{8}$ " ALLOY STEEL

at O. K. RUBBER, INC.



- more than doubled tap life
- increased tap speed 38%
- improved quality of tapped hole
- eliminated the "mess" and excessive coolant cost of flood method
and
- paid for itself in one month
in machine cleaning time alone

WRITE FOR DETAILS IN NORGREN BLUEPRINT SL-3

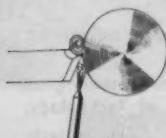
NORGREN SPRAY-LUBE SYSTEM

An Automatic, Air-Powered System for More Efficient Single or Multi-Point Application of Cutting Liquids to Metal Cutting and Forming Operations! For Tapping

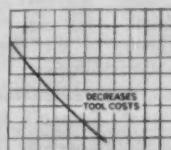
Machines, Drill Presses, Lathes, Milling Machines, Grinders, Stamping Presses, Boring Mills, Deep Draw Presses and Other Metal Working Machines.

NEW ADVANTAGES THAT ARE PRODUCING SPECTACULAR RESULTS ON PRODUCTION LINES

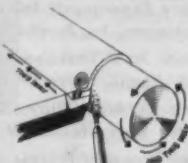
COOLANT WHERE YOU NEED IT
COOLS FASTER



LONGER TOOL LIFE —
LESS "DOWNTIME"



FASTER CUTTING SPEEDS AND FEEDS



SAVES ON LIQUID CONSUMPTION
AND RECLAMING PROCESSES



PIONEER AND LEADER IN OIL-FOG LUBRICATION FOR 26 YEARS

VALVES • FILTERS • HOSE ASSEMBLIES • REGULATORS • LUBRICATORS

C. A. CO.
3435 So. Eleti, Englewood, Colo.



Program of ASM Technical Papers

Technical Sessions at Palmer House

Monday, November 1 — 9:30 A.M.

Constitutional Diagrams

The Aluminum-Vanadium Alloy System—By O. N. Carlson, D. J. Kenney and H. A. Wilhelm, Institute for Atomic Research and Department of Chemistry, Iowa State College, Ames, Iowa.

Partial Phase Diagram of the Iron-Cerium System—By James O. Jepson, Research Engineer, Jet Propulsion Laboratory, and Pol Duwez, Prof. of Mech. Engineering and Chief of Materials Section of Jet Propulsion Laboratory, California Institute of Tech., Pasadena.

The Titanium-Cobalt System—By F. L. Orrell, Jr., Dow Chemical Co., Midland, Michigan, and M. G. Fontana, Head, Department of Metallurgy, Ohio State University, Columbus, Ohio.

The System Titanium-Aluminum-Manganese—By R. F. Domagala, Associate Metallurgist, and W. Rostoker, Senior Metallurgist, Research Department, Armour Research Foundation of Illinois Institute of Technology, Chicago, Illinois.

Constitution of Ordering Alloys of the System Copper-Gold—By F. N. Rhines, Professor of Metallurgy, W. E. Bond, Research Assistant, and R. A. Rummel, Laboratory Assistant, Metals Research Laboratory, Carnegie Institute of Technology, Pittsburgh, Penna.

Monday, November 1—9:30 A.M.

Laboratory Instruction in Process Metallurgy

(Special Session ASM Advisory Committee on Metallurgical Education)

Development of Laboratory Experiments for the Unit Process Approach to Extractive Metallurgy
—By Professor Schuhmann, Jr., Purdue University.

The Role of Metallurgical and Thermodynamic Problems in the Metallurgical Engineering Laboratory—By C. S. Samis, University of British Columbia.

Unit Process Experiments in Fluid Flow, Combustion, and Heat Transfer for Metallurgical Engineering Students—By Professor W. O. Philbrook, Carnegie Institute of Technology.

Special Problems for Experiments in Process Metallurgy Laboratory—By Professor A. W. Schlechten, Missouri School of Mines.

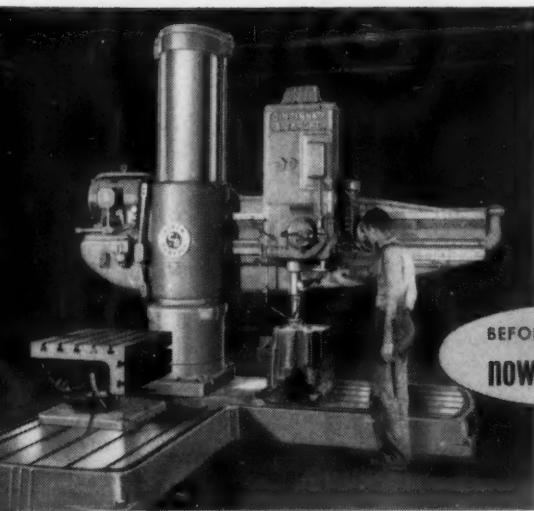
The Role of Electrochemical Experiments in Process Metallurgy Instruction—By Professor Herbert H. Kellogg, Columbia University.

BICKFORD cuts

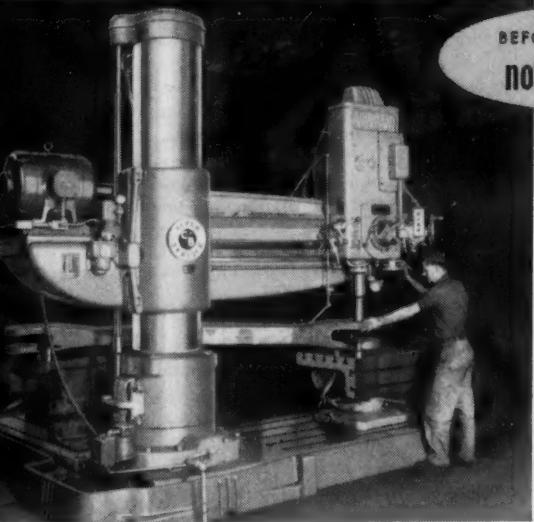
floor

to floor

time!



BEFORE 38 MINUTES
now 23 minutes



BEFORE 5 HOURS
now 3 hours

These two jobs are done with time savings at the Ohio Steel Foundry Company of Lima, Ohio.

The machine (upper illustration) is drilling breech rings for guns from 76MM to the 155MM size. In this tough material a $2\frac{1}{2}$ diameter lead hole is drilled and opened up to a $3\frac{1}{2}$ diameter with a core drill.

Machine, below, is drilling $3\frac{1}{16}$ lead holes in a 9-foot Ladle Vale. Holes are opened up with a single point boring tool. Time savings result from the outstanding ease of control, and the power and rigidity of Super Service Radial Drills.

For power, accuracy, easy handling, check on Cincinnati Super Service Radial Drills.

Write for Catalog R-29.



RADIAL AND UPRIGHT DRILLING MACHINES

.....
**CINCINNATI
BICKFORD**

THE CINCINNATI BICKFORD TOOL CO.
Cincinnati 9, Ohio, U.S.A.

Program of ASM Technical Papers—Continued

Monday, November 1—2:00 P.M.

Mechanical Metallurgy

The Effect of Prestraining Under Different Stress States on the Fracture and Flow Properties of 2S-0 Aluminum—By I. Rozalsky, Wood River Res. Lab., Shell Oil Co., Wood River, Ill.

Deformation Mechanisms in Polycrystalline Aggregates of Magnesium—By F. E. Hauser, C. D. Starr, L. S. Tietz and J. E. Dorn, Professor of Metallurgy, Minerals Research Laboratory, University of California, Berkeley.

Tensile and Impact Properties of Low Carbon Martensites—By C. C. Busby and H. W. Paxton, Metals Res. Lab., Carnegie Institute of Technology; M. F. Hawkes, Quality Engineering Laboratory, U. S. Naval Ammunition Depot, Hawaii.

The Tensile Characteristics of Unalloyed Zirconium at Low and Moderate Temperatures—By J. H. Keeler, Research Laboratory, General Electric Co., Schenectady, N. Y.

Monday, November 1—2:00 P.M.

Processing

The Influence of Chemical Composition on the Machinability of Rephosphorized Open Hearth Screw Steel—By E. J. Paliwoda, Research Engineer, Metal Research Division, Jones & Laughlin Steel Corp., Pittsburgh, Penna.

The Influence of the Grinding Process on the Structure of Hardened Steel—By W. E. Littmann, Research Metallurgist, The Timken Roller Bearing Co., Canton, Ohio, and John Wulff, Professor of Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

The Zonal Rolling Texture of Low Carbon Steel Cold-Rolled at Various Temperatures—By C. Nusbaum, Associate Professor of Physics, Case Institute of Technology and Consultant of the Cold Metal Products Company, and W. Brenner, Jr., Metallurgist, The Cold Metal Products Co., Youngstown, Ohio.

Tuesday, November 2—9:30 A.M.

Hardenability

An Electron Metallographic Study of the Dependence of Microstructure on Hardenability—By S. T. Ross, Project Engineer, R. P. Sernka, Research Metallurgist, and W. E. Jominy, Chief Metallurgical Research, Chrysler Corp., Detroit.

Calculation of Hardenability in High Carbon Alloy Steels—By C. F. Jatczak and R. W. Devine, Jr., Research Metallurgists, The Timken Roller Bearing Co., Canton, Ohio.

The Hardenability of Carbon Tool Steel—By N. J. Culp, Metallurgical Department, The Carpenter Steel Co., Reading, Pa.

Effect of Carbon and Nitrogen on the Attainable Hardness of Martensitic Steels—By A. E. Nehrenberg, P. Payson and P. Lillys, Research Laboratory, Crucible Steel Company of America, Harrison, New Jersey.

"doing a job" at *Tool Steel* *

STANDARD
TWIN WHEEL TOOL GRINDERS

**"Doing a job"
is right!**

30% decreased
grinding time,
grinding costs
way down, less
operator fatigue,
greater wheel
life, increased
production.

* Here's what the Tool Room Superintendent at the
Tool Steel Gear and Pinion Co., Cincinnati, Ohio says:

*"Since installation this Standard Tool Grinder
has had no downtime . . . required no maintenance
other than routine. We use the machine daily, some-
times continuously on production wet-grinding of
carbide tipped bub-turning, offset turning, boring and
other high-speed steel tools. It's by far the
best precision grinder we've used."*

Outstanding performance? No . . . just typical
of the Standard Twin Wheel Tool Grinder.

Available in 10" and 14" wheel sizes; wet or
dry. No spray or splash when wet-grinding.
Two operators can grind at once. Conserves floor
space. Write for Bulletin TW today for full details.

standardize with . . .

the **STANDARD** electrical tool co.

2487 RIVER RD. • CINCINNATI 4 • OHIO



Program of ASM Technical Papers—Continued

Tuesday, November 2—2:00 P.M.

Physical Metallurgy

Conditions for Dendritic Growth in Alloys—By W. Morris, W. A. Tiller, J. W. Rutter and W. C. Winegard, Department of Metallurgical Engineering, University of Toronto, Toronto, Canada.

Stress-Corrosion Mechanism in a Magnesium-Base Alloy—By D. K. Priest, Pfaudler Company; F. H. Beck, Assistant Research Professor, and M. G. Fontana, Professor, Department of Metallurgy, Ohio State University, Columbus, Ohio.

Thermodynamics of Binary Interstitial Solid Solutions—By R. Speiser, Associate Professor, Department of Metallurgy, Ohio State University, Columbus, Ohio.

Influence of Substructure on the Shape of the Creep Curve—By T. Hazlett and R. D. Hansen, Research Engineering Department, University of California, Pasadena, California.

Wednesday, November 3—9:00 A.M.

ASM Annual Meeting

Campbell Memorial Lecture—By Kent R. Van Horn, Aluminum Company of America.

Wednesday, November 3—2:00 P.M.

Ferrous Physical Metallurgy

Further Study of Microstructural Changes on Tempering Iron-Carbon Alloys—By B. S. Lement, Research Staff (Division of Industrial Cooperation); B. I. Averbach, Associate Professor, and M. Cohen, Professor of Physical Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

Effects of Cold-Work on Cementite in Steel—By D. V. Wilson, Lecturer, Department of Industrial Metallurgy, Birmingham University, Edgbaston, Birmingham, England.

The Isothermal Transformation of Austenite Under Externally Applied Tensile Stress — By S. Bhattacharyya and G. L. Kehl, Associate Professor of Metallurgy, Columbia University, New York.

Wednesday, November 3—2:00 P.M.

Mechanical Properties

The Elastic Limit and Yield Behavior of Hardened Steels—By H. Muir, Senior Lecturer, Otago University, Dunedin, New Zealand; B. L. Averbach, Assoc. Professor, and Morris Cohen, Professor, Department of Metallurgy, Massachusetts Institute of Tech., Cambridge.

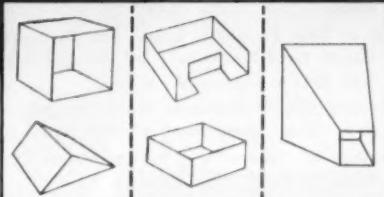
Effect of Composition on Transverse Properties of Slack-Quenched Steel—By J. Vajda and P. E. Busby, Metals Research Laboratory, Carnegie Institute of Technology, Pittsburgh, Penna.

The Statistical Fatigue Properties of Lamellar and Spheroidal Eutectoid Steel—By G. E. Dieter, Ordnance Corps; R. F. Mehl, Director, Metals Research Laboratory, and G. T. Horne, Metals Research Laboratory, Carnegie Institute of Technology, Pittsburgh, Penna.

Effect of Static Stress on the Damping of Some Engineering Alloys—By A. W. Cochardt, Metallurgy Department, Westinghouse Electric Corp., East Pittsburgh, Penna.



di-acro* BOX FINGER BRAKE



Form and Duplicate a Wide Variety of Shapes in Metal as Heavy as 16 Gauge—Widths up to 24"—with Versatile DI-ACRO BRAKES

A number of forming jobs can be done with the Di-Acro Box Finger Brake by simply adjusting or changing the type of mounting bar on the contact surface. Di-Acro Finger Brake is:

1. **A Box and Pan Brake**—when equipped with a complete set of Box Fingers.
2. **An Open End Brake**—when Open End Finger is installed in place of Box Fingers.
3. **A Bar Folder**—when an Acute Angle Bar replaces the Box Finger mounting.
4. **A Standard Brake**—when a Forming Bar is mounted for heavy operations.

*pronounced Die-ack-ro
Creators of
"Die-Less Duplicating"



WANT MORE INFORMATION? Send for 32-Page Catalog

O'NEIL-IRWIN MFG. CO. 306 8th Ave., Lake City, Minn.



Program of ASM Technical Papers—Continued

Thursday, November 4—9:30 A.M.

Stainless

The Effect of Cold Work and Recrystallization on the Formation of the Sigma Phase in Highly Stable Austenitic Stainless Steels—By A. J. Lena, Associate Director of Research, and W. E. Curry, Chief Metallographer, Allegheny Ludlum Steel Corp., Brackenridge, Penna.

The Laves and Chi Phases in a Modified 12 Cr Stainless Alloy—By F. L. VerSnyder and H. J. Beattie, Jr., Thomson Laboratory, General Electric Company, West Lynn, Mass.

Austenitic Chromium-Manganese-Nickel Steels Containing Nitrogen—By R. Franks, Mgr., W. O. Binder, and J. Thompson, Technical Service and Development Dept., Electro Metallurgical Co., Niagara Falls.

The Effect of Deformation on the Martensitic Transformation in Austenitic Stainless Steels—By H. C. Fiedler, Research Laboratory, General Electric Co., Schenectady; B. L. Averbach, Assoc. Prof., and M. Cohen, Professor, Dept. of Metallurgy, Massachusetts Institute of Technology, Cambridge.

Thursday, November 4—9:30 A.M.

Heat Treatment

The Role of Water Vapor and Ammonia in Case Hardening Atmospheres—By P. A. Clarkin and M. B. Bever, Department of Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

Effect of Heat Treatment upon Microstructures, Microconstituents, and Hardness of a Wrought Cobalt Base Alloy—By J. W. Weeton and R. A. Signorelli, Lewis Flight Propulsion Laboratory, NACA, Cleveland.

Secondary Graphitization of Quenched and Tempered Ductile Cast Iron—By J. C. Danko and J. F. Libsch, Department of Metallurgy, Lehigh University, Bethlehem, Penna.

A Method for Determining the Continuous Cooling Transformation in Steel—By R. D. Chapman, Research Metallurgist, and W. E. Jominy, Chief Metallurgist-Research, Engineering Division, Chrysler Corp., Detroit, Mich.

Thursday, November 4—2:00 P.M.

High Temperature

Elevated Temperature Properties of Ductile Cast Irons—By C. R. Wilks, Metallurgist; M. A. Matthews, Assistant Chief Metallurgist, and R. Wayne Kraft, Jr., Metallurgist, American Brake Shoe Company, Mahwah, New Jersey.

Effect of Cold Work on the High Temperature Creep Properties of Dilute Aluminum Alloys—By R. E. Frenkel, Research Engineer, Oleg D. Sherby, Research Engineer; and John E. Dorn, Professor of Physical Metallurgy, University of California, Berkeley, California.

Creep-Tempering Relationships in Hardened 4.5 Per Cent Chromium Steels—By E. C. Roberts, Asst. Prof. of Metallurgy, Montana School of Mines, Butte, Montana; N. J. Grant, Associate Professor of Metallurgy, and Morris Cohen, Professor of Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

The Strength of Wrought Zirconium-Base Binary Alloys at 1800 to 2200 Deg. F.—By H. A. Saller, J. T. Stacy and S. W. Porembka, Battelle Memorial Institute, Columbus, Ohio.

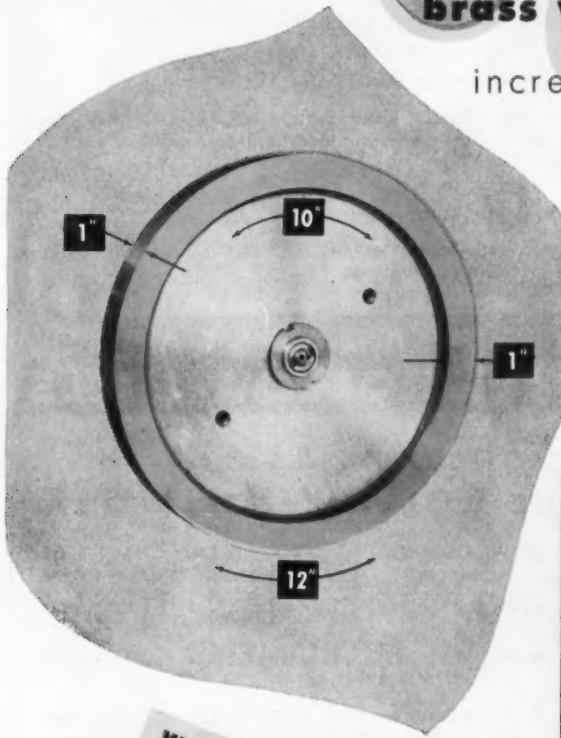
**you can
sharpen**

4,800

$\frac{1}{2} \times \frac{1}{2}$ tungsten carbide

insert tools with this \$45
brass wheel and
increase tool life

50 to 200%



Ave. cost per tool sharpened:
.009¢

Convert from abrasive
and diamond wheels
to an Elox brass
wheel and save 50
minutes sharpening 20
carbide insert tools.

WE CAN SHOW YOU HOW!

elox corporation of michigan

739 north rochester road • clawson, michigan

ASM Educational Lectures

All Sessions in Red Lacquer Room, Palmer House

Temperature Measurement

Monday, November 1—4:30 P.M.

Industrial Temperature Measurement with Thermocouple Pyrometers—By W. E. Belcher, Jr., Products and Application Engineer, Minneapolis-Honeywell Regulator Co., Brown Instruments Division.

Tuesday, November 2—4:30 P.M.

Industrial Temperature Measurement with Total Radiation and Optical Pyrometers—By Donald Robertson, Heat Pyrometer Section, Engineering Dept., Leeds and Northrup Co.

Wednesday, November 3—4:30 P.M.

Industrial Temperature Measurement with Resistance Thermometers and Filled Systems—By W. F. Hickes, Assistant to Chief Engineer, The Foxboro Co.

KUTMORE ADJUSTABLE HOLLOW MILLS



DESIGNED FOR ALL YOUR HOLLOW MILLWORK

- ANY COMBINATION OF . . . TURNING . . . TAPERING . . . FACING . . . CHAMFERING . . . TREPANNING IN ONE PASS.
- EXCLUSIVE **MICROMETER** ADJUSTMENT FEATURE FOR RAPID SET-UP.
- CUTTING CAPACITIES FROM 1/32" TO 2" DIAMETER IN STANDARD STOCK. IMMEDIATE DELIVERY.

WRITE FOR CATALOGUE No. 20 MM

OUR ENGINEERING DEPARTMENT IS AT YOUR
DISPOSAL ON YOUR HOLLOW MILL PROBLEMS

CARL WIRTH & SON, INC.

1625 CLINTON AVE. NO.
ROCHESTER 5. N. Y.

GET A
CLEAR-CUT
PICTURE
OF SAVINGS



WITH ★
JOHNSON BEARINGS

Johnson Bearings in standard, stock sizes are available through your local Johnson Distributor. He will save you delays because he stocks a wide range of sizes of Johnson Sleeve Bearings and Bronze Bars. He saves you machining time because Johnson Bearings will fit over 90% of your sleeve bearing needs. He saves you money because he can furnish you low cost, standard, stock size Johnson Bearings at much less than made-to-order bearings.

JOHNSON BRONZE COMPANY
590 South Mill Street • New Castle, Pa.



JOHNSON BEARINGS
Sleeve-J Type

Write for the Johnson Bearing Catalog

1954 ASM Award Winner

Albert Sauveur Achievement Award—American Society for Metals



Alexander L. Feild,
Armco Steel
Corporation

Alexander L. Feild, Associate Director, Research Division, Armco Steel Corporation, is the 1954 winner of the Albert Sauveur Achievement Award, presented by the American Society for Metals. The award was established by ASM in 1934 in honor of Dr. Albert Sauveur, late Harvard University Professor and widely known as the "Dean of American Metallurgists." The purpose of the award is to recognize pioneering metallurgical achievements which have stimulated organized work along similar lines to such an extent that a marked basic advance in metallurgical knowledge has been made.

The 1954 Sauveur Medalist is one of the country's outstanding authorities on stainless steel, and is in charge of Armco's stainless steel research staff, with headquarters in Baltimore, Maryland. Dr. Feild is a graduate of the University of North Carolina, and received an honorary degree of Doctor of Science from Stevens Institute of Technology. In 1940, he received a Modern Pioneer Award for his inventions relating to a rustless process for melting stainless steel. During World War I, Dr. Feild was research metallurgist with the Bureau of Mines in Pittsburgh, and later held positions as research metallurgist with the Union Carbide and Carbon Corporation and the Central Alloy Steel Corporation.

HANCHETT
circular saw sharpeners

for RIP, CROSSCUT and
SMOOTH TRIM SAWS

FULLY AUTOMATIC

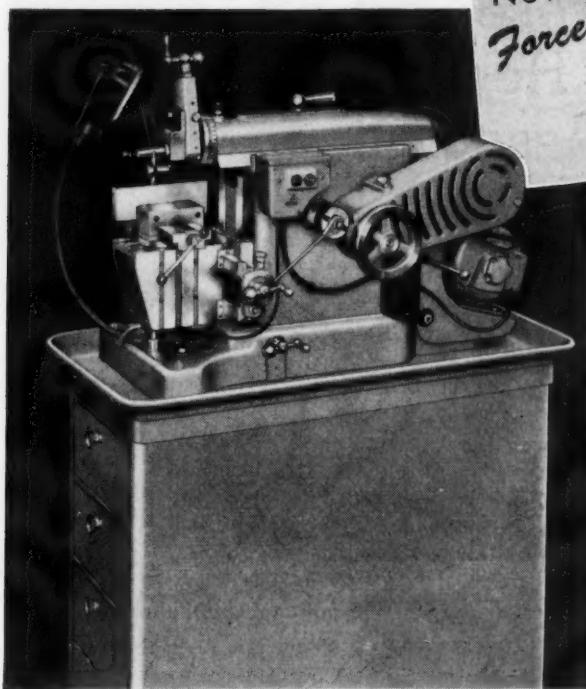
Available with Hanchett Airshift*
and new pedestal Mounting Stand
6" to 36" dia. — other sizes
up to 84" dia. and larger.
*over 15% less moving parts

HANCHETT MANUFACTURING COMPANY

World's Largest Manufacturer of Saw Sharpening and Knife Grinding Machinery

MAIN OFFICE — Big Rapids, Michigan WEST COAST — Portland 1, Oregon

A detailed technical illustration of a Hanchett Model 724 circular saw sharpener. The machine is a large, vertical unit with a heavy-duty frame. It features a large circular grinding wheel at the top, a smaller鐾 (baid) wheel, and a worktable below. Various belts, pulleys, and a motor are visible on the side. A circular badge on the side of the machine reads "MODEL 724".



New!
Force-Feed
LUBRICATION
 TO ALL IMPORTANT
 BEARING SURFACES

SOUTH BEND 7" Shaper

THE ONLY BENCH SHAPER
 WITH CIRCULATING FORCE-
 FEED LUBRICATION TO IM-
 PORTANT BEARING SURFACES

SPECIFICATIONS

Ram

Stroke length—0 to 7".
 Strokes per minute (4)—42
 to 195.

Tool Head

Travel—3". Swivels—360°

Table

9½" horizontal travel, 5½" vertical. Power cross-feeds (6)—.002" to .012". Clears ram—½" to 5½".

You will be surprised at the variety of jobs this well-built 7" precision bench shaper will do. With it you can machine keyseats in shafts, pulleys, or gears; finish flat surfaces; square ends of shafts; machine slots, dovetails and grooves. Price \$551 f.o.b. factory, less motor and stand.



SEND INFORMATION CHECKED:



9" and 10" BENCH LATHE



10" to 16-24" FLOOR LATHE



DRILL PRESSES



TOOL GRINDERS



1½" & 2" Collet TURRET LATHE



7" BENCH SHAPERS

Name _____ Street _____

City _____ State _____



Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

Three Special Sessions Presented By Industrial Heating Equipment Association

Three important and practical panel sessions on furnace atmospheres and induction heating will be presented by the Industrial Heating Equipment Association under the auspices of the American Society for Metals during the National Metal Congress and Exposition. The program of these sessions is as follows:

Tuesday Morning, November 2—Palmer House Atmospheres

Theory of Gases—By Allen G. Hotchkiss, General Electric Co.
Exothermic Atmosphere—By W. H. Boyd, Gas Atmospheres, Inc.
Endothermic Atmosphere—By Ralph J. Perrine, Electric Furnace Co.
Dry Nitrogen—By Donald Beggs, Surface Combustion Co.
Dissociated Ammonia—By M. R. Ogle, Drever Co.
Control and Safety—By W. L. Besselman, Leeds & Northrup Co.

Tuesday Afternoon, November 2—International Amphitheatre Atmosphere Applications

Carburizing—By Walter Holcroft, Holcroft & Co.
Advantages of Measuring Carbon Potential by Dew Point—By N. K. Koebel, Lindberg Engineering Co.
Methods of Measuring Carbon Potential by Dew Point—By O. E. Cullen, Surface Combustion Co.
Brazing (Movie)—By LeRoy B. Thompson.
Carbonitriding—By Harold Ipsen, Ipsen Industries.
Neutral Heat Treating—By A. W. Frank, Hevi Duty Electric Co.
Sintering—By Carl G. Paulson, C. I. Hayes, Inc.

Wednesday Afternoon, November 3—International Amphitheatre Induction Sessions

Induction Melting—By G. W. Holz, Lindberg Engineering Co.
Induction Brazing—By E. S. Goodridge, Induction Heating Corp.
Induction Heat Treating—By H. B. Osborn, Jr., TOCCO Div., Ohio Crankshaft Co.
Sixty Cycle Induction Heating for Forming and Extrusion—By John A. Logan, Magnethermic Corp.
High Frequency Induction Heating for Hot Forging—By Frank T. Chesnut, Ajax Electrothermic Corp.
Dual Frequency Heating for Hot Forging—By Carl P. Bernhardt, Westinghouse Electric Corp.



Just as a Negative guarantees you an exact duplication of a photograph, you are assured a

Positive Duplication of an original grinding wheel thru the CINCINNATI (PD) Manufacturing Process.

NOW!
Cincinnati
Grinding Wheels
offer
POSITIVE
DUPLICATION



It's a fact! The CINCINNATI (PD) Manufacturing Process assures a Positive Duplication of the original wheel *every time* you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind *exactly alike*. Yet they are priced no higher than ordinary wheels.

Let us prove to you how CINCINNATI (PD) WHEELS can save you money and increase your production. Just contact us and we'll send one of our representatives—

men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio



LONG FACED

OVER YOUR TOOL
STEEL FLAT STOCK



...THEN TRY **ATKINS** SilverSteel®

- Oil hardening, electric furnace tool steel made to rigid specifications—latest metallurgical development.
- Precision-ground on all four surfaces. Sides parallel and square, free of defects and decarburization.
- Hardens deeply with closely refined grain structure—unusually tough!
- Withstands many grinds—gives long production runs.
- Tendency to warp or change dimensions as result of heat treatment is negligible.
- Now available in all standard sizes.

Use for dies in operations such as: Blanking • Trimming • Punching • Forming • Piercing • Perforating • Embossing . . . any work that demands accuracy. Cutting and finishing non-ferrous metals—particularly brass and bronze.

Call Your Atkins Distributor



ATKINS SAW DIVISION
BORG-WARNER CORPORATION • Indianapolis 9, Ind.



SEND FOR
FREE CIRCULARS.

MATTISON
HIGH-POWERED
PRECISION
SURFACE GRINDERS

• Rugged, High Powered and Versatile, Mattison Precision Surface Grinders with double-column construction are built to handle your grinding jobs on a real production basis, providing repeated precision results and a fine finish.

They are built with table sizes from 12" to 36" wide by 36" to 192" long.

**WIDE ABRASIVE-BELT
GRINDING and POLISHING MACHINE**

• From the time factory coated abrasives were introduced for metal polishing and grinding, Mattisons have developed and built machines properly applying belts to do the job to be done. The Wide-Belt Sheet Grinder and Polisher shown above is for finishing stainless steel and alloy sheets in sizes up to six feet wide and sixteen feet long.

MATTISON

MACHINE WORKS

ROCKFORD • ILLINOIS

Officers of the American Welding Society



President
Fred L. Plummer



First Vice-President
J. H. Humberstone



Second Vice-President
J. J. Chyle



Secretary
J. G. Magrath



Program of AWS Technical Papers

Technical Sessions at Hotel Sherman

Monday, November 1—10:00 A.M.

Award of Prizes

Adams Lecture

Louis XVI Room

Chairman—F. L. Plummer, President, American Welding Society

Co-Chairman—H. C. Boardman, Chairman, Technical Papers Committee

The Toughness of Weldability—By William L. Warner, Watertown Arsenal.

Monday, November 1—2:00 P.M.

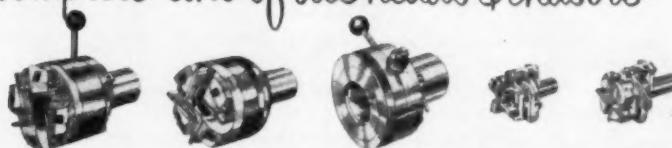
Two Simultaneous Sessions

1—Resistance Welding

Ballroom

- A. Flashwelding High-Strength Steels—By W. G. Fassnacht, Bendix Aviation Corp.
- B. Effect of Post Treatment on the Properties of Flash Welds—By Ernest F. Nippes, Warren F. Savage, Gordon Grotke and S. M. Robelotto, Rensselaer Polytechnic Institute.
- C. The Effects of Prestressing on the Strength Characteristics of Spot Welds in 17-7 Stainless Steels Under Cyclic Loads—By V. N. Krivohok, International Nickel Co., and J. A. Choquet and G. Welter, Ecole Polytechnique.

Jones & Lamson offers... a complete line of die heads & chasers



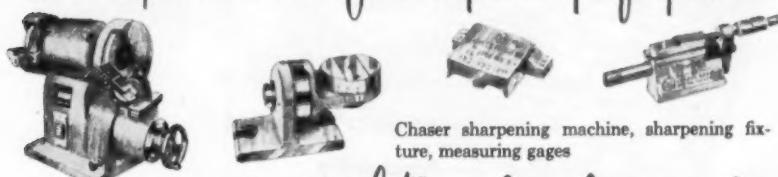
Automatic opening tangent stationary and revolving types, radial stationary type, B&S and small turret lathe types

a complete line of accessories



External and internal trip attachments, drill press adapter, floating holders

a complete line of sharpening equipment



Chaser sharpening machine, sharpening fixture, measuring gages

a complete engineering service



World's newest, most modern thread tool plant. Complete literature for all J&L thread tool products



J&L Automatic Opening Die Heads and Chasers assure: low initial cost — ease of operation — controlled resharpening — use of carbide where applicable. Class III threads guaranteed. This means important savings regardless of your tolerance requirements. Write to Dept. 710 for complete information.

JONES & LAMSON

JONES & LAMSON MACHINE CO., 521 Clinton St., Dept. 710, Springfield, Vt., U.S.A.



Machine Tool Craftsmen
Since 1835

THREAD TOOL DIV.

Program of AWS Technical Papers—Continued

2—Weldability

Assembly Room

- A. The Effect of Microstructure on Notch Toughness, Part II—By John H. Gross and Robert D. Stout, Lehigh University.
- B. Impact Testing Weld Metal and Heat-Affected Zone Simultaneously—By W. P. Hatch, Jr., and C. E. Hartbower, Watertown Arsenal.
- C. Applicability of Charpy Test Data—By Peter P. Puzak, Martin E. Schuster and W. S. Pellini, Naval Research Laboratory.

Monday, November 1—6:00 P.M.

President's Reception

Crystal and Louis XVI Rooms

Monday, November 1—8:00 P.M.

National Dinner

Bal Tabarin

Tuesday, November 2—9:30 A.M.

Three Simultaneous Sessions

3—Weldability

Assembly Room

- A. Isothermal Studies on Weld-Metal Microcracking in Mild Steel—By Alan E. Flanigan and Z. P. Saperstein, University of California.
- B. Crack-Starter Tests of Ship Fracture and Project Steels—By P. P. Puzak, Martin E. Schuster and W. S. Pellini, Naval Research Laboratory.
- C. Continuous Cooling Transformation Characteristics of Three Types of Weld Metal—By E. F. Nippes and E. C. Nelson, Rensselaer Polytechnic Institute.

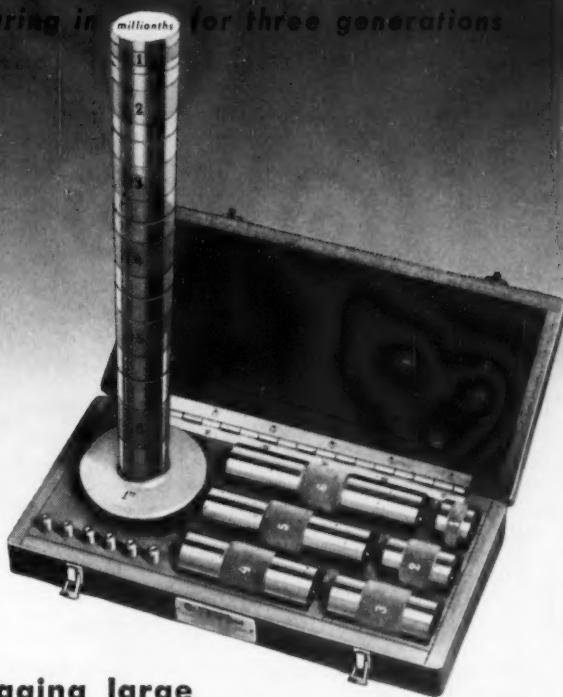
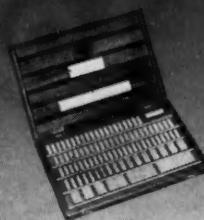
4—Resistance Welding

Crystal Room

- A. Spot Welding Aluminum with Single-Phase Equipment—By J. W. Kehoe and D. R. McCutcheon, Westinghouse Electric Corp.
- B. Seam Welding Low-Carbon Steel—By M. I. Bergeman and Gene C. Walker, University of Texas.
- C. Automatic Percussion Welding—By A. L. Quinlan, Western Electric Co.

Ellstrom

measuring in ^{millions} for three generations



Save time in gaging large dimensions with this Ellstrom "Build-Up" Set!

What a time-saver this Ellstrom "Build-Up" Set is when it comes to checking large dimensions to millions of an inch accuracy! Six round gage blocks from one to six inches, plus a standard base one inch high. Just select the right combination of blocks, wring them together on the 4" dia. base. Then add standard gage blocks to establish the exact decimal dimensions desired! It's quick, easy, accurate . . . with far less chance of error, and none of the normal hazards encountered in building up large combina-

tions with regular gage blocks. Won't topple over . . . and if knocked over, blocks are held in combination by internal locking screws. Ideal for surface plate checking, setting visual gages or amplifiers, as well as for checking work on planers and horizontal boring mills. And each block is backed by the traditional heritage of Ellstrom . . . *measuring in millions for three generations.*

New fact-filled catalog contains complete information on the entire Ellstrom Standards line. Send for it today!



ELLSTROM STANDARDS DIVISION

Dearborn Gage Company • 22035 Beech Street • Dearborn, Michigan

Originators of Chromium Plated Gage Blocks



Program of AWS Technical Papers—Continued

5—Shielded Arc Welding

Louis XVI Room

- A. Recent Developments in Contact Electrodes—By D. L. Mathias, Acrods Corp.
- B. Electrodes with Powdered Metal Coatings, A Progress Report—By Jerry Hinkel, The Lincoln Electric Co.
- C. Metallic Rectifiers for Arc Welders—By G. K. Willecke, Miller Electric Mfg. Co.

Tuesday, November 2—2:00 P.M.

Section Officers Meeting

Crystal Room

Tuesday, November 2—2:00 P.M.

Two Simultaneous Sessions

6—Weldability

Assembly Room

- A. Arc Welding Embrittlement of Powder Metals—By Albert Sill, Jr., and C. C. Mathias, Sperry Corp.
- B. Weldability of Wrought, High-Alloy Materials—By R. P. Culbertson, Haynes Stellite Co.

7—Surfacing

Louis XVI Room

- A. High Nickel Alloy Overlays on Ferrous Metals—By George R. Pease, H. B. Bott and H. C. Waugh, International Nickel Co.
- B. The Inert Gas Metal Arc Overlay Process—By C. R. Felmley, Air Reduction Sales Co., Inc.
- C. Automatic Hard Surfacing in the Mining and Construction Industries—By I. R. Bartter, Automatic Welding Co.

Wednesday, November 3—9:30 A.M.

Three Simultaneous Sessions

8—Aircraft and Rocketry

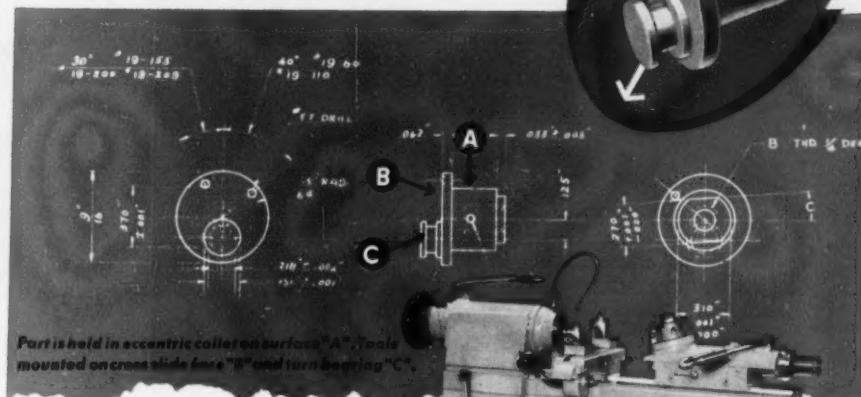
Crystal Room

- A. Production of High-Strength Aluminum Alloy Rocket Motor Tubing by Means of an Induction Weld Tube Mill—By W. S. Tenner and H. C. Wheeler, U. S. Naval Ordnance Test Station.
- B. Metallurgical Aspect of Welding Precipitation Hardening Stainless Steels—By C. W. Funk and M. J. Granger, Aerojet-General Corp.
- C. The Macro Etch System of Evaluating Quality of Resistance Welding—By D. O. Samuelson and F. G. Harkins, Solar Aircraft Co.

INSTANT START-STOP

boosts Penn Fishing Tackle
parts to 250 per hour!

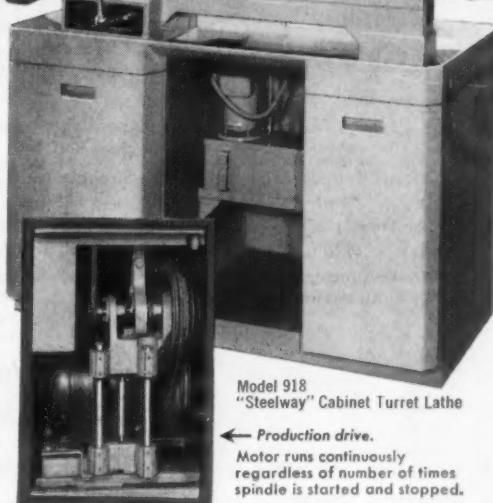
250 of these parts
per hour led Penn
Fishing Tackle Mfg. Co.
to reorder additional
Rivett 918 "Steelways."



Penn Fishing Tackle Mfg. Co. went fishing to catch ideas for stepping up production of eccentric parts. The Rivett 918 "Steelway" Cabinet Turret Lathe with its production drive proved ideal for their needs.

This production drive features "split-second" starting and stopping of the spindle by movement of the lever chuck closer handle. With one forward pull, the operator closes collet on work, releases brake and engages spindle drive. When lever is pushed back, spindle drive is disengaged, brake mechanism is applied and work is released.

A 918 "Steelway" can boost your production, too! Why not go fishing and see what savings can be caught!



**Model 918
"Steelway" Cabinet Turret Lathe**

← **Production drive.**
Motor runs continuously
regardless of number of times
spindle is started and stopped

RIVETT

LATHE & GRINDER, Inc.

Dept. MMR-11, Brighton 35, Boston, Mass.

Program of AWS Technical Papers—Continued

9—*Titanium, Zirconium and Molybdenum*

Louis XVI Room

- A. Notch Toughness of Weld Deposits in Titanium Plate—By D. M. Daley, Jr., and C. H. Hartbower, Watertown Arsenal.
- B. The Welding of Zirconium—By Ralph V. Hilkert and Harold H. Hollenbeck, Titanium Alloy Manufacturing Division, National Lead Co.
- C. The Influence of Oxygen on the Joining of Molybdenum—By Timothy G. Perry, H. Stephen Spacil and John Wulff, Massachusetts Institute of Technology.

10—*Inert Arc Welding*

Assembly Room

- A. New Techniques in Inert-Gas-Shielded Metal-Arc Welding—By R. W. Tuthill, General Electric Co.
- B. Inert Gas Welding of Stator Packs—By F. J. Pilia, Linde Air Products Co.
- C. A Production Application of Inert-Gas-Shielded Metal-Arc Welding of Mild Steel—By John L. Lang, Lukenweld Division of Lukens Steel Co.

Wednesday, November 3—2:00 P.M.

Three Simultaneous Sessions

11—*Pressure Vessels and Piping*

Assembly Room

- A. The Plastic Fatigue Behavior of High-Strength Pressure Vessel Steels—By John H. Gross and Robert D. Stout, Lehigh University.
- B. Further Studies of the Biaxial Fatigue Properties of Pressure Vessel Steels—By C. E. Bowman and T. J. Dolan, Department of Theoretical and Applied Mechanics, University of Illinois.
- C. Automatic Tungsten-Inert-Arc Welding of Pipes in Position, Without the Use of Backing Rings—By L. C. McNutt, Benjamin F. Shaw Co.

12—*Brazing*

Crystal Room

- A. Silver Brazing of Refractory Metals—By C. H. Chatfield, Handy & Harman.
- B. Filler-Metal Strengths in Brazed Copper Joints—By W. H. Munse and D. C. Crawford, University of Illinois.
- C. Investigation of the Factors Determining the Tensile Strength of the Brazed Joint—By Nikolajs Bredzs, Armour Research Foundation of Illinois Institute of Technology.



Winning Point with OPERATORS...

CIMCOOL® COOLS SO FAST that workpiece, tools and chips actually stay cool to the touch! With this radically new and different cutting fluid on the job, there is no need for gloves, no need to cool the workpiece before removing it from the machine.

And there are other reasons why CIMCOOL scores with operators. This revolutionary cutting fluid—this chemical emulsion—virtually eliminates rancidity and foul odors. Can't burn. Can't smoke. Doesn't soil hands or clothes and contains no skin irritants. And leaves no hazardous slippery film on the hands, machine, workpiece or floor.

Let us show you how CIMCOOL can put your plant in the winning column. We'll be

pleased to demonstrate—on your own machines—how CIMCOOL makes jobs better... and does a better job. Just write us and we'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet, "Cimcool Defeats Heat." Address Sales Manager, Dept. S-114, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

®Trade Mark Reg. U.S. Pat. Off.

CIMCOOL

for 85%
of all metal cutting jobs

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

Program of AWS Technical Papers—Continued

13—*Symposium on Fused Metallized Coatings* (Sponsored by AWS Committee on Metallizing)

Louis XVI Room

- A. Fundamentals of Fused Metallized Coatings—By Bela Ronay, U. S. Naval Engineering Experimental Station.
- B. Practical Applications of Fused Self-Fluxing Metallized Coatings—By Harvey S. Miller, New England Hardfacing Co.
- C. Practical Applications of Fused Non-Self-Fluxing Metallized Coatings—By Sam Tour, Sam Tour & Co., Inc.

Wednesday, November 3—6:30 P.M.

WRC University Dinner

Emerald Room

Wednesday, November 3—8:00 P.M.

WRC University Conference

Crystal Room

Thursday, November 4—9:30 A.M.

Three Simultaneous Sessions

14—Aircraft

Crystal Room

- A. Considerations for Fatigue in Aircraft Welding Design—By J. Kozierski, Piasecki Helicopter Corp.
- B. Properties of Welds in Al-Mg-Mo Alloys XK186 and XK183—By D. A. Cook and S. L. Channan, Kaiser Aluminum and Chemical Corp., and A. R. Hard, State College of Washington.
- C. High-Temperature Alloy Brazing of Thin Materials for Jet Engines—By A. S. Rose and W. N. Lewis, I-T-E Circuit Breaker Co.

15—*Design and Production*

Assembly Room

- A. Prediction of Angular Distortion Caused by One-Pass Fillet Welding—By T. Kumose, T. Yoshida, T. Abbe and H. Onoue, Yokohama Shipyard & Engine Works, Mitsubishi Nippon Heavy Industries, Ltd.
- B. Triaxial Tensile Stresses in Arc Welded Mild Steel—By Harry E. Kennedy, University of California.
- C. Automatic Welding Builds Railroad Cars—By H. D. Hollis, Texas & Pacific Railway Co.



for the complete story
on circular saw blades
and face milling cutters

* * *
TRIPLE-CHIP Saw Blades
KROSLOK® Milling Cutters

THE
MOTCH & MERRYWEATHER
MACHINERY CO.

Cutting Tool Manufacturing Division
CLEVELAND 17, OHIO

Fifty Years

The M. & M. Triple-Chip grind
reduces tooth strains, lengthens
blade life, and speeds production
with accuracy.

SEE ALSO — THE MOTCH & MERRYWEATHER
KROSLOK MILLING CUTTER..



Only 3 members — body, blade,
wedge. Waffle design of blade
mates rigidly with waffle in body.
Cuts any machinable material.
A profit-making investment in
precision production milling.

SEE ALSO — Motch & Merryweather
Triple-Chip Heavy Duty Anti-Weld
Soluble Oil.



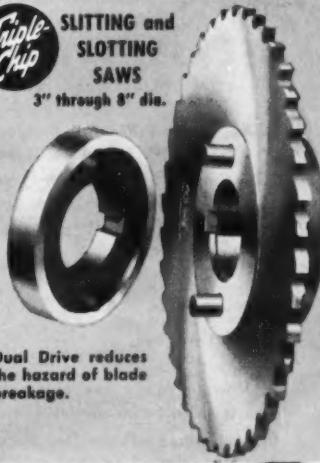
See M. & M. saw blades from the
big 108" diameter Triple-Chip
segmental cut-off blade down
to slitting saws 3" in diameter.

SEE ALSO — Triple-Chip solid blades,
8" through 20" diameter for cutting off
smaller stock.

SEE ALSO — MOTCH & MERRYWEATHER



SLITTING and
SLOTTING
SAWS
3" through 8" dia.



Dual Drive reduces
the hazard of blade
breakage.

SEE ALSO — Motch &
Merryweather Triple C
Grinding Coolant.



Program of AWS Technical Papers—Continued

16—Cutting Ballroom

- A. Oxygen Cutting with Iron Powder and Chemical Flux Additives—By R. L. Deily and J. R. Kirwin, Air Reduction Sales Co.
- B. Sigma Arc Cutting—By R. S. Babcock, Linde Air Products Co.
- C. Improved Method of Oxy-Fuel Gas Combination—By Edward H. Roper, Air Reduction Sales Co.

Thursday, November 4—2:00 P.M.

Business Meeting Crystal Room

Friday, November 5—9:30 A.M.

Three Simultaneous Sessions

17—High-Temperature Materials Assembly Room

- A. An Investigation of the Hot Ductility of High-Temperature Alloys—By Ernest F. Nippes, Warren F. Savage, H. F. Mason and B. J. Bastian, Rensselaer Polytechnic Institute.
- B. Interpreting Graphitization in High-Temperature, High-Pressure Steam Piping—By H. Thielsch, E. M. Phillips and E. R. Jerome, Jr., Grinnell Co., Inc.
- C. The Welding of Type 347 Stainless Steel for the Higher Steam Turbine Operating Temperatures—By R. M. Curran and A. W. Rankin, General Electric Co.

18—Structural Ballroom

- A. Behavior of Welded Single Span Frames Under Combined Loading—By C. G. Schilling, F. W. Schultz, Jr., and L. S. Beidle, Fritz Engineering Laboratory, Lehigh University.
- B. Fatigue Strength of Butt Welds in Structural Steels—By L. A. Harris, G. E. Nordmark and N. H. Newmark, Talbot Laboratory, University of Illinois.
- C. New Concepts in Spot X-Ray of Welded Structures—By Harold Hovland, Industrial X-Ray Engineers.

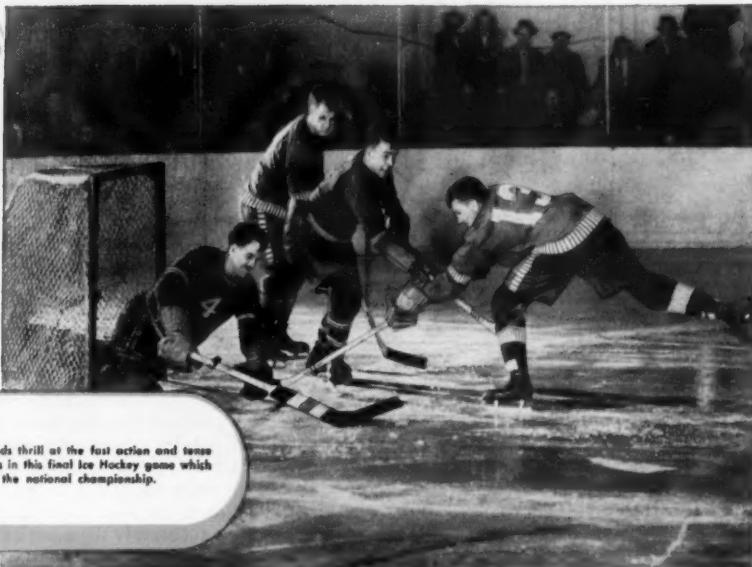
19—Applications Old Chicago Room

- A. How to Apply Semiautomatic Submerged Arc Welding—By Robert A. Wilson, Lincoln Electric Co.
- B. Mechanized Flame Descaling, Dehydrating and Priming of Prefabricated Plate—By C. H. Cowan, Avondale Marine Ways, Inc., and J. R. Kirwin, Air Reduction Sales Co.
- C. Automatic Hardfacing with Mild Steel Electrodes and Agglomerated Alloy Fluxes—By J. S. McKeighan, The Lincoln Electric Co.

LOGAN

... a national participant in major
fluid power advancements

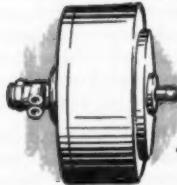
SINCE 1916



Thousands thrill at the fast action and tense moments in this final Ice Hockey game which decides the national championship.

LOGAN ROTATING AND NONROTATING AIR CYLINDERS

FAST-ACTING, POSITIVE CONTROLLED POWER . . . AT LOW COST

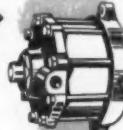


Rotating Air Cylinder

NONROTATING—7 STANDARD MOUNTING TYPES

Standard sizes from $1\frac{1}{2}$ " to 16" bore; maximum stroke, 18 feet. Special models to meet your requirements.

Logan Features—Larger Ports . . . More Sturdy Construction . . . Maximum Power Without Leakage . . . Permanent Seal Around Piston Rod . . . Standard Models With or Without Cushioning.



Nonrotating Double-Acting Air Cylinder

Consult Logan for your special heavy-duty, high-pressure cylinder requirements

ROTATING

Two Standard Styles—Type R with cast iron body; Type K with lightweight aluminum body.

Bore diameter $1\frac{1}{2}$ " to 20"; piston stroke 1" to 2"; longer strokes available as special. American Standard adaptations.

LOGAN MANUFACTURES 6,975 STANDARD CATALOGED ITEMS
FREE CATALOG ON REQUEST

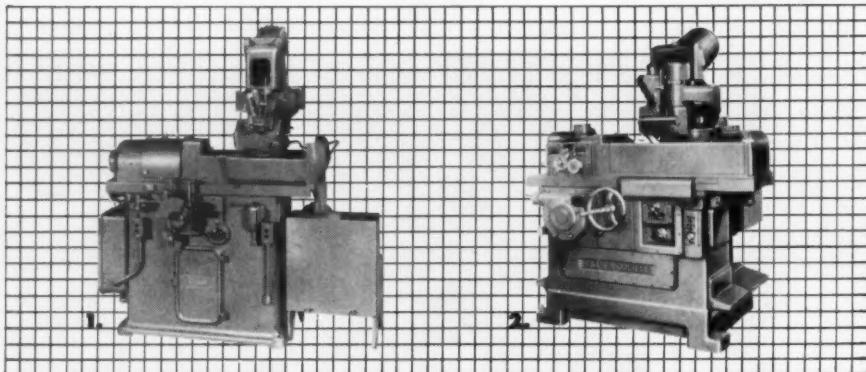
AIR CONTROL VALVES, Cat. 100-4 • AIR CHUCKS, Cat. 78-1 • AIR CYLINDERS, Cat. 100-1 • AIR-DRUALIC CYLINDERS, Cat. 100-3
AIR and HYDRAULIC PRESSES, Cat. 51 • COLLET GRIP TUBE FITTINGS, Cat. 200-5 • HYDRAULIC CONTROL VALVES, Cat. 200-4
HYDRAULIC CYLINDERS, Cat. 200-2; 200-3 • HYDRAULIC POWER UNITS, Cat. 200-1 • SURE-FLOW COOLANT PUMPS, Cat. 62



LOGANSPORT MACHINE CO., INC., 801 CENTER AVE., LOGANSPORT, IND.

**AUTOMATIC
HOB
SHARPENING**

the efficient way



Barber-Colman Sharpening Applicable to All Hobs and Form-Relieved Cutters

Sharpening is the one element of hob accuracy which the user must maintain. For high production sharpening or for small, job-lot sharpening, the most economical and most accurate method is the Barber-Colman method. Three machines cover the size range of your work and the price range for your specific requirements. One of these three automatic machines, the No. 4-4, No. 6-5 or No. 10-12, will do your job cheaper, faster and more accurately than can be done by any other method.

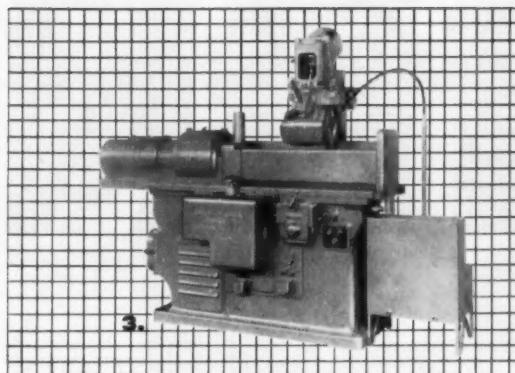
Keep Tool Maintenance On A Production Basis

Positive mechanical control over all sharpening factors takes the human element out of resharpening hobs and formed cutters. It is the efficient way to sharpen these tools because it puts sharpening on a production basis and automatically produces uniformity, reduces sharpening time, and saves the operator's time for other duties. Spacing, lead of gash and radialism are held within the tolerances for any accuracy classification, including Class AA. Any hob or formed cutter can be sharpened on one of these automatic sharpening machines.

All Barber-Colman hobs and form-relieved cutters are sharpened on these machines. Because of their accuracy and ease of operation, these machines are also used by most competitive hob manufacturers for sharpening their hobs. Tolerances for the specific class of hob are easily held, and one operator can operate several machines. Once the necessary set-up is made, sharpening proceeds automatically without further attention from the operator.

B U I L D E R S O F P R E C I S I O N G E A R

TO MAINTAIN HOBS AND PROLONG CUTTING LIFE



3.

1. No. 4-4 Automatic Sharpening Machine. High Production, Fixed Stroke. Work 4" Diameter, 4" Length. Wet Grinding Optional (Shown).

2. No. 6-5 Automatic Sharpening Machine. Adjustable Table Stroke for Maximum Production. Wet Grinding Standard. Work 6" Diameter, 5" Length.

3. No. 10-12 Automatic Sharpening Machine. Adjustable Table Stroke for Maximum Production. Large Work up to 10" Diameter, 12" length. Wet Grinding Optional.

New Features Set-Up Sharpening Production, Versatility and Convenience

With costs a vital factor in maintaining competitive position, many new features and improvements in Barber-Colman Automatic Sharpening machines will help you place man-hours and tool costs on a competitive basis.

Wet grinding is an ideal arrangement for sharpening carbide tools, and also permits higher sharpening feeds on high-speed steel tools. It is optional on No. 4-4 and No. 10-12 machines, but is standard equipment on the No. 6-5 Sharpener.

Adjustable stroke increases convenience and sharpening speed. This is a standard feature on both the No. 6-5 and No. 10-12 machines. New wheel spindle, work spindle and tail center designs have been incorporated in all machines for increased accuracy, convenience and output.

Check these new features for sharpening efficiency on your production operations and cost-reduction in tool programs. For full details on the complete line of Automatic Sharpening Machines, see your Barber-Colman representative or write direct to Automatic Hob Sharpening.

Complete data on cause and effect of hob sharpening errors, as well as detection and correction of such errors is contained in this recent issue of Hobbing Notes. Write for Vol. XI, No. 1 on your company letterhead and we will mail you a copy promptly.



HOBS • CUTTERS • REAMERS
HOBBLING MACHINES
HOB SHARPENING MACHINES



Barber-Colman Company

GENERAL OFFICES AND PLANT, 8511 ROCK STREET, ROCKFORD, ILL.

HOBS AND MACHINES SINCE 1911

Officers Institute of Metals Division
American Institute of Mining and Metallurgical Engineers



President
Leo F. Reinartz



Secretary
E. H. Robie



Chairman
J. H. Scatt



Secretary & Treasurer
Ernest O. Kirkendall



Technical Papers
Program of AIME
Institute of Metals Division

Technical Sessions at the Morrison Hotel

Sunday, October 31—4:30 P.M.

IMD Publications Committee Meeting

W. R. Hibbard, Jr., *Chairman*

Sunday, October 31—8:00 P.M.

IMD Program Committee Meeting

D. J. Blickwede, *Chairman*

Monday, November 1—9:30 A.M.

Ballroom

Deformation

W. A. Backofen, *Chairman*

Mechanism of Ortho Kink-Band Formation in Compressed Zinc Monocrystals—By J. J. Gilman,
General Electric Co.

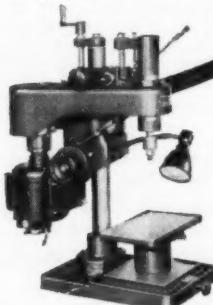
precision product?

EXACT
HOLES ARE
IMPERATIVE!



HAMILTON VARIMATIC®
Super Sensitive
Variable Speed
Small Hole
Precision
Drilling Machine

Are you fighting the never-ending battle of trying to produce exact holes on a drilling machine which, itself, is not built to precision tolerances? You are under no necessity to do so. For the difference in price between the cheapest bench type, small hole drilling machine and the Hamilton Varimatic is reckoned in pennies per day. And the Hamilton Varimatic (holes from .004" to $\frac{1}{4}$ " in all drillable materials) is *super sensitive*. Provides speeds, *infinitely variable*, between 840 R.P.M. and 9300 R.P.M. Is built to precision tolerances, and with the stamina to retain precision.



Get prices and specifications without obligation

ASK FOR **FREE** BULLETIN 5408

Address The Hamilton Tool Company
828 South Ninth Street
Hamilton, Ohio

IT'S A
Hamilton Tool
USE IT WITH CONFIDENCE

Program of AIME Institute of Metals Division Papers—Continued

Strain Hardening of Latent Slip Systems in Zinc Crystals—By E. H. Edwards, Standard Oil Company of California, and J. Washburn, University of California.

Effects of Temperature on the Deformation of Beta Brass—By C. S. Barrett, University of Chicago.

Quantitative Substructure and Tensile Property Investigations of Nickel Alloys—By E. R. Parker and B. Ancker, University of California.

Stress-Strain Characteristics and Slip Band Formation in Metal Crystals—By F. C. Rosi, RCA Laboratories.

A Method of Measuring the Contribution of Crystal Structure to the Hardness of Metals—By Walston Chubb, Battelle Memorial Institute.

Monday, November 1—9:30 A.M.

Cotillion Room

Constitution

S. C. Carapella, Jr. and B. D. Cullity, Chairmen

Columbium-Vanadium Alloy System—By H. A. Wilhelm, O. N. Carlson and J. M. Dickenson, Iowa State College.

Solid Solubility of Oxygen in Columbium—By A. U. Seybolt, General Electric Co.

Solubility of Oxygen in Alpha Iron—By A. U. Seybolt, General Electric Co.

Precipitation of Iron Oxide from Alpha-Iron-Oxide Solid Solutions—By A. U. Seybolt, General Electric Co.

Chromium-Rich Portion of the Chromium-Nickel Phase Diagram—By Charles Stein and N. J. Grant, Massachusetts Institute of Technology.

Effect of Nitrogen on Sigma Formation in Nickel-Chromium Steels at 1200 Deg. F.—By G. F. Tisina, J. K. Stanley and C. H. Samans, Standard Oil Company of Indiana.

Solubility and Decomposition Pressures of Hydrogen in Alpha-Zirconium—By E. A. Gulbransen and K. F. Andrew, Westinghouse Electric Corp.

Monday, November 1—2:00 P.M.

Diffusion

J. H. Keeler and R. W. Baluffi, Chairmen

Mobilities in Diffusion in Alpha Brass—By G. T. Horne and R. F. Mehl, Carnegie Institute of Technology.

Self Diffusivity Along Edge Dislocation Singular Lines in Silver—By A. H. Hendrickson and E. S. Machlin, Columbia University.

Rate of Self-Diffusion in Polycrystalline Magnesium—By P. G. Shewmon and F. N. Rhines, Carnegie Institute of Technology.

Determination of the Self-Diffusion Coefficients of Gold by Autoradiography—By H. C. Gatos, E. I. du Pont de Nemours and Co., Inc., and A. D. Kurtz, Mass. Institute of Technology.

Cation Self-Diffusion in Wustite and Cobaltous Oxide and an Examination of the Decrease of Surface Activity Method of Measuring Self-Diffusion Coefficients—By R. E. Carter, Department of Mines and Technical Surveys, Canada, and F. D. Richardson, Imperial College of Science and Technology, England.

Solution Rate of Solid Aluminum in Molten Aluminum-Silicon Alloy—By C. M. Craighead, E. W. Cawthorne and R. I. Jaffee, Battelle Memorial Institute.

NOW CUT COST OF PRECISION GEAR PRODUCTION

5410

THIS FEATURE: "Independent selection of speed, feed and indexing," sets the Hamilton Precision Small Gear Hobber apart from the field,

AND ENABLES the users of this machine to vary speed and feed to suit the material being machined.

THIS FACT, and a "reserve of accuracy" built into the machine, work spindle and hob spindle runout of less than .0002" as an example,

CONTRIBUTES to more gear precision with no sacrifice of gear production,

OR INCREASED gear production with no sacrifice of gear precision,
..... OR BOTH!

Prices and specifications without obligation

ASK FOR **FREE** BULLETIN 5410

Address

The Hamilton Tool Company
828 South Ninth Street
Hamilton, Ohio



Program of AIME Institute of Metals Division Papers—Continued

Monday, November 1—2:00 P.M.

Ballroom

Powder Metallurgy and Oxidation

A. J. Shaler, Chairman

Electron Optical Study of the Initial Stages of Oxidation of High-Purity Iron at Oxygen Pressures of 0.1 to 2 Microns of Hg Between 650 and 850 Deg. C.—By W. A. McMillan, K. F. Andrew and E. A. Gulbransen, Westinghouse Research Laboratories.

High Pressure Oxidation of Metals—Tantalum in Oxygen—By R. C. Peterson, W. M. Fassell, Jr., and M. E. Wadsworth, University of Utah.

Warm Pressing of Beryllium Powder—By N. P. Pinto, Sylvania Electric Products, Inc.

Influence of Additives in the Production of High Coercivity of Ultra-Fine Iron Powder—By G. P. Conard II, E. W. Stewart and J. F. Libsch, Lehigh University.

Monday, November 1—4:30 P.M.

Membership Committee Meeting

J. P. Nielsen, Chairman

Monday, November 1—8:00 P.M.

Ballroom

Metal Science

J. H. Hollomon and Bruce Chalmers, Chairmen

Precipitation Out of Dual Solid Solutions of Carbon and Nitrogen in Iron—By C. Wert, University of Illinois.

Creep of Silver Bromide at High Temperatures—By R. W. Christy, Dartmouth College.

The Effect of Relative Crystal and Boundary Orientations on Grain Boundary Diffusion Rates—By D. Turnbull and R. E. Hoffman, General Electric Co.

Effect of the Structure of Dislocation Boundaries on Yield Strength—By J. Washburn, University of California.

Tuesday, November 2—9:00 A.M.

Cotillion Room

General

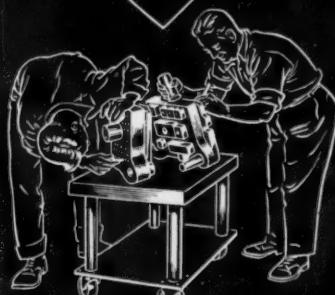
Howard Scott and Paul Gordon, Chairmen

Influence of Carbon and Manganese on the Properties of Semikilled Hot Rolled Steel—By F. W. Boulger and R. H. Frazier, Battelle Memorial Institute.

Temper Embrittlement of 5140 Steel—By S. A. Bush and C. A. Siebert, University of Michigan.

**do you
WASTE MONEY
RISK ACCIDENT
doing things the
HARD WAY?**

Take a trip through your plant today and note how many assembly and maintenance operations are being done in awkward or tiresome positions.



Imagine
THEM BEING DONE ON
PORTELVATOR[®]
THE HANDY HAMILTON PORTABLE ELEVATING TABLE

With Portelvator hundreds of assembly and maintenance jobs are accomplished at the right height and in the best light. And that means money in the bank and workmen on the job; faster work and fewer accidents.

Portelvator prices start at \$155.00—
place a couple at your workmen's
disposal and watch results.

Complete description in
FREE Bulletin No. P-5403.

WRITE FOR IT!
Address The Hamilton Tool Company,
828 South Ninth Street, Hamilton, Ohio

IT'S A
Hamilton Tool
USE IT WITH CONFIDENCE

Program of AIME Institute of Metals Division Papers—Continued

The Coefficients of Thermal Expansion of Zirconium—By R. B. Russell, Massachusetts Institute of Technology.

Physical and Mechanical Properties of Rhenium—By C. T. Sims, C. M. Craighead and R. I. Jaffee, Battelle Memorial Institute.

The Ferromagnetism of Certain Manganese Rich Alloys—By E. R. Morgan, Ford Motor Co.

The Preparation and Arc Melting of High Purity Iron—By G. W. P. Rengstorff and H. B. Goodwin, Battelle Memorial Institute.

Mathematical Methods for Zone Melting Processes—By Howard Reiss, Bell Telephone Labs.

The Viscosity and Density of Liquid Lead-Tin and Antimony-Cadmium Systems—By H. J. Fisher, Department of Mines and Technical Surveys, Canada, and Arthur Phillips, Yale University.

Tuesday, November 2—9:00 A.M.

Ballroom

Third Annual Symposium on Titanium

Technical Review Papers

W. L. Findlay and V. W. Whitmer, Chairmen

Interesting Alloy Systems, Commercial Alloys, Melting and Hot Working of Titanium—By D. J. McPherson, Armour Research Foundation of Illinois Institute of Technology.

General Physical Metallurgy, Including Effects of Interstitials, Heat Treatment and Joining of Titanium—By R. I. Jaffee, Battelle Memorial Institute.

Hydrogen in Titanium—By Harold Kessler, Titanium Metals Corp. of America.

Use of Titanium in Airframes—By Gordon Fairbairn, North American Aviation, Inc.

Use of Titanium in Aircraft of the Future—By N. E. Promisel, Navy Department, Bureau of Aero.

Tuesday, November 2—12:30 P.M.

IMD Executive Committee Luncheon Meeting

J. H. Scaff, Chairman

Tuesday, November 2—2:00 P.M.

Ballroom

Third Annual Symposium on Titanium (continued)

Panel Discussion

W. A. Dean and L. D. Jaffee, Chairmen

Panelists:

L. A. Best, Douglas Aircraft Co.

L. R. Frazier, General Electric Co.

T. W. Lippert, Titanium Metals Corp. of America.

Frank Vandenburg, Mallory-Sharon Titanium Corp.

Major R. J. Kotfila, Wright-Patterson Air Force Base.

J. B. Sutton, E. I. du Pont de Nemours & Co., Inc.

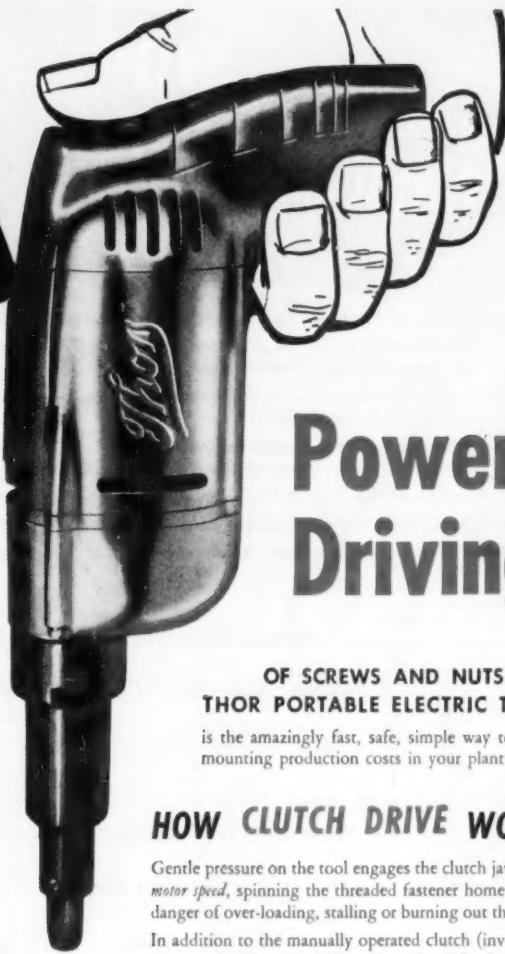
This Mass-
Production
Technique
Automatically
Boosts
Production

Drive all
SCREWS
Set all
NUTS with

Thor
ELECTRIC
Screwdrivers
and
Nut Setters

116 MODERN MODELS

Capacities No. 8 to No. 24
Screws and 1/2" Bolts.



Power Driving

OF SCREWS AND NUTS WITH
THOR PORTABLE ELECTRIC TOOLS.

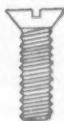
is the amazingly fast, safe, simple way to reduce
mounting production costs in your plant.

HOW CLUTCH DRIVE WORKS

Gentle pressure on the tool engages the clutch jaws at full motor speed, spinning the threaded fastener home with no danger of over-loading, stalling or burning out the motor. In addition to the manually operated clutch (invented by Thor engineers in 1921) Thor also offers "slip clutches" and "kick-out clutches" which can be set to automatically drive thousands of threaded fasteners to exact, pre-determined tension, completely independent of the skill or judgment of the operator. Worth investigating today!

Sold by leading Industrial Supply Distributors everywhere.

THOR POWER



TOOL COMPANY
AURORA, ILLINOIS

EXPORT DIVISION: 330 W. 42ND ST., NEW YORK 36, NEW YORK

Program of AIME Institute of Metals Division Papers—Continued

Tuesday, November 2—2:00 P.M.

Cotillion Room

Phase Transformations and Recrystallization

E. S. Machlin and J. K. Stanley, Chairmen

On the Nucleation of Pearlite—By M. E. Nicholson, University of Chicago.

A Study of the Effect of Boron on the Decomposition of Austenite—By C. R. Simcoe, A. R. Elsea and G. K. Manning, Battelle Memorial Institute.

Characteristics and Stabilization of the Bainite Reaction—By R. F. Nehemann and A. R. Trojano, Case Institute of Technology.

Some Characteristics of the Isothermal Martensitic Transformation—By B. I. Averbach, C. H. Shih and Morris Cohen, Massachusetts Institute of Technology.

Ordering Reaction of the Cu₄ Pd Alloy—By A. H. Geisler and J. B. Newkirk, General Electric Co.

A Mechanism for the Origin of Recrystallization Nuclei—By J. P. Nielsen, New York University.

A New High Temperature Reaction Calorimeter—By O. J. Kleppa, University of Chicago.

Tuesday, November 2—4:00 P.M.

Nuclear Metallurgy Committee Meeting

D. W. Lillie, Chairman

Wednesday, November 3—2:00 P.M.

Cotillion Room

Creep

H. E. Howe, Chairman

Some Observations on Grain Boundary Shearing During Creep—By J. E. Dorn, Bernard Fazen and O. D. Sherby, University of California.

Some Observations on the Tertiary Stage of Creep of High Purity Aluminum—By G. R. Wilms, Reference Standards Laboratories, Australia.

Creep Rupture Characteristics of Aluminum-Magnesium Solid Solution Alloys—By A. W. Mullen-dore, Wright-Patterson Air Force Base, and N. J. Grant, Massachusetts Institute of Technology.

Creep Behavior of Magnesium-Cerium Alloys—By C. S. Roberts, Dow Chemical Co.

Creep Rupture Properties and Structural Changes in Carbon and Low Alloy Steels—By A. B. Wilder, E. F. Ketterer and D. B. Collyer, National Tube Division, U. S. Steel Corp.



**EFFECTIVE-
EFFICIENT*
aye, and ECONOMICAL,
too!**

PARALLOC Dial Snap Gages

With a remarkable new type of pin locking mechanism that minimizes "out-of-parallelism" between anvil faces. "L" Type fully encased, with set-back indicator and handle, permitting entry into narrow recesses. Wide choice of indicators as for "D" Type.



PATENTED

"L" (LEVER) TYPE

8 SIZES, each with $\frac{1}{2}$ " range,
cover over-all range 0" to 4"

← "D" (DIRECT) TYPE

8 SIZES, each with 1" range,
cover over-all range 0" to 8"

DuBo Plug Gages

SINGLE END
Sizes over 1.510"

DOUBLE END
Sizes under 1.510"



PATENTED

Whether handle will drop freely or
not shows "Go" or
"NoGo". Finger-
tip operation reveals internal
bore conditions by sensitive
"feel". Tells more, more easily,
than ordinary plug gages.

DIAL INDICATORS



A complete range of
sizes and mountings,
with any desired
graduation; regular,
metric or Decimalic
... all completely
shockproof.

- **EFFICIENCY**
- **EASE OF HANDLING**
- **EASE OF READING**
- **LONG SERVICE LIFE**
- **REDUCTION OF FALSE REJECTS**

DIAL Bore Gages

10 SIZES

cover range from

1/8" to 24"

PATENT
APPLIED
FOR

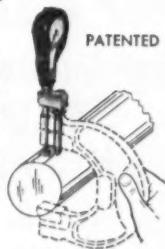


Three new models
extend dial bore
gaging range by
intermediate steps
down to $\frac{1}{8}$ " diameter.
Each utilizes STANDARD's
new, highly practical
CENTERING-SIZE
DISC principle. Simple in
design, easy to set, easy to
use; amazingly accurate and
effective in small bore gaging.

Dializers®

STANDARD's original device for
converting AGD Adjustable Limit
Snap Gages to DIAL Snap Gages.
Wide range of indicators from
 $1\frac{1}{2}$ " to $2\frac{1}{4}$ " diameter, graduations
of .001", .0001", .0005" and
.00025", and a wide variety
of dial markings, including metric.

Available separately for
your frames or assembled
in AGD frames
supplied by us.



PATENTED

Write for "NEWS"; get full
details of new STANDARD
instruments that speed pro-
duction and save you time,
money and worry.



Gage Co., Inc.
Poughkeepsie, N.Y.

Program of AIME Institute of Metals Division Papers—Continued

Wednesday, November 3—2:00 P.M.

Ballroom

Titanium

H. D. Kessler and Harold Margolin, Chairmen

Correlation Between Microstructure and Resistivity of Transforming Ti-Mn Alloys—By D. J. Delazaro, Krupp Forge Co., and D. W. Levinson, Armour Research Foundation of Illinois Institute of Technology.

Effect of Alpha Solutes on the Heat Treatment Response of Ti-Mn Alloys—By H. R. Ogden, F. C. Holden and R. I. Jaffee, Battelle Memorial Institute.

Mechanical Properties of Alpha Titanium as Affected by Structure and Composition—By R. I. Jaffee, F. C. Holden and H. R. Ogden, Battelle Memorial Institute.

Heat Treatment and Mechanical Properties of Ti-Cu Alloys—By F. C. Holden, A. A. Watts, H. R. Ogden and R. I. Jaffee, Battelle Memorial Institute.

Structure and Properties of Ti-C Alloys—By H. R. Ogden, R. I. Jaffee and F. C. Holden, Battelle Memorial Institute.

The Titanium-Lead System—By Paul Farrar and Harold Margolin, New York University.

Phase Transformations in Titanium-Rich Alloys of Iron and Titanium—By J. G. Parr and D. H. Polonis, University of British Columbia.

Selected Isothermal Sections in the Titanium-Rich Corners of the Systems Ti-Fe-O, Ti-Cr-O and Ti-Ni-O—By W. Rostoker, Armour Research Foundation of Illinois Institute of Technology.

For Unvarying ACCURACY...

Standardize on ECONOMY
"TRU-LOC"
Adjustable Adapters
& Nut

- ✓ CONCENTRIC
- ✓ GROUND ACME THREADED BODY
- ✓ "TRU-LOC" NUT — Lock in Any Position
- ✓ WOODRUFF KEYWAY — Relieved

All items in stock — immediate delivery assured. Write for latest Bulletin and Price List.



Economy

"TRU-LOC" Adapter
Sleeves
A.S.A. Drill Jig Bushings
A.G.D. Plug & Ring
Gages



Economy

TOOL & MACHINE CO.

1827 S. 68th St. • Milwaukee 14, Wis.

Microbore

STANDARD BORING BAR SETS

for use on all Makes and Types
of Boring and Milling Machines



Discuss your
tooling problems
with our
Microbore specialists

Standard Microbore Boring Bar Sets
are available in a wide range of sizes with
Morse Taper or Milling Machine Taper Shanks
Send for new illustrated Catalog.

DE VLIEG MICROBORE COMPANY
480 Fair Avenue, Ferndale • Detroit 20, Michigan

Officers Society for Non-Destructive Testing



President
Gerold H. Tenney



Vice-President
William C. Hitt



Secretary
Philip D. Johnson



Treasurer
Hamilton Migel



Program of SNT Technical Papers

Technical Sessions at Morrison Hotel

Monday, November 1—9:00 A.M.

Call to Order—By W. C. Hitt, Douglas Aircraft Co., Inc., General Chairman.

Welcome—By Dr. Gerold H. Tenney, Los Alamos Scientific Labs., President SNT.

Educational Program

General Chairman—S. A. Wenk, Battelle Memorial Institute

Orientation Lecture—By R. C. McMaster, Battelle Memorial Institute.

Sources of Defects Located by Nondestructive Testing—By C. E. Beitz, Magnaflux Corp.

Radiography—By R. G. Tobey, Eastman Kodak Co.

Magnetic Particle Inspection—By W. E. Thomas, Magnaflux Corp.

Monday, November 1—1:30 P.M.

Penetrant Inspection—By H. Migel, Magnaflux Corp.

Ultrasonics—By J. C. Smack, Sperry Products Inc., Peter Block, Branson Instrument Co.

Inter-Relation of Various Testing Methods—By A. F. Cota, A. O. Smith Corp.

Evaluation of Indications of Discontinuities—By J. H. Bly, X-Ray, Inc.

Question Period.

POPE

the leading builder of precision spindles

REPAIRS SPINDLES TOO

BELT DRIVEN — MOTORIZED — HIGH CYCLE

ANY SIZE — ANY MAKE

OF ANTI-FRICTION BEARING SPINDLE THAT IS REPAIRABLE

For precision grinding, milling or boring, Spindles must be in first class running condition to produce good work and more of it.

The place to have your Spindles built to their original performance is where Precision Spindles are built.

You can send your Spindles to us with CONFIDENCE, knowing the job will be done right the first time and at the lowest possible cost. Cost figures are submitted for your approval before we proceed with the work.



**FOR FAST SERVICE,
THE RIGHT BEARINGS,
BETTER WORKMANSHIP AND
LUBRICATION, AT LOWER COST**
Send your Spindle repair work to

Spindles repaired and rebuilt by POPE are dynamically balanced to the same tolerances as new Spindles. This means better surface finishes and smoother running Spindles.

No. 102
POPE MACHINERY CORPORATION

Established 1920
261 River St. • Haverhill, Massachusetts

ASK US TO MAIL YOU A COPY OF SPINDLE REPAIR BULLETIN R-1

Program of SNT Technical Papers—Continued

Tuesday, November 2—9:00 A.M.

Chairman—Norman C. Miller, Los Alamos Scientific Lab.

Co-Chairman—Robert E. Reynolds, Lockheed Aircraft Co.

High Sensitivity Fluoroscopy—By Charles A. Mitchell, Mitchell Radiation Corp.
(Subject To Be Announced)—By Stanley Stacey, Foster Wheeler Corp.

Tuesday, November 2—2:00 P.M.

International speakers covering various phases of nondestructive testing as used abroad and applications of eddy current testing.

Chairman—W. E. Havercroft, Dept. of Mines & Technical Surveys, Canada.

Co-Chairman—R. G. Coleman, Chairman Ontario Sec. SNT, Ontario, Canada.

The Preparation and Handling of Intense Radioactive Sources—By Dr. Peter J. Stewart, Isotope Products Ltd., Ontario, Canada.

New Techniques in the Electro-Magnetic Nondestructive Testing Methods—By Dr. Friedrich Foerster, Institut Dr. Foerster, Kurrenstrasse 14, Reutlinger (Western Zone), Germany.

(Subject To Be Announced)—By Dr. R. Seifert, Hamburg, Germany.

Wednesday, November 3—9:00 A.M.

Ultrasonics

Chairman—E. M. Marcus, Fairchild Aviation Corp.

Co-Chairman—D. E. O'Halloran, Northrop Aircraft Corp.

Monitors—Steve Sickle, Magnaflux Co., Charles Widstrand, Ford Motor Co.

Reference Standards—By Al Barath, Douglas Aircraft Co.

(Subject To Be Announced)—By J. B. Morgan, Aluminum Co. of America.

(Subject To Be Announced)—By J. E. Rutledge, McDonnell Aircraft Co.

DYKEM
STEEL BLUE
Stops Losses
making Dies and
Templates

Popular package
8-oz. can fitted
with Bakelite cap
holding soft-hair
brush for applying right
at bench; metal surface
ready for layout in a few min-
utes. The dark blue background
makes the scribed lines show up in
sharp relief, prevents metal glare.
Increases efficiency and accuracy.

Write for sample on company letterhead
THE DYKEM COMPANY
2301F North 11th St. • St. Louis 6, Mo.

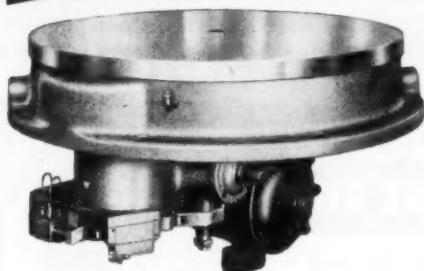
With DYKEM Steel Blue Without DYKEM Steel Blue

SPECIMEN

automatic cam feed units

Avey
has both...

automatic index tables



Automatic Index Tables

meet demand for Drilling and Tapping Equipment
Made in sizes 16", 20", 24", 30", 36" and 40" diameter. Indexes, 3 to 100 stations.

These Index Tables are self-contained units, built on unit construction principle and includes motor drive assemblies. All drive and control mechanisms underneath table for free work surface... easy accessibility.

Send for Bulletins

THE AVEY DRILLING MACHINE CO.
Cincinnati 1, Ohio



Automatic Cam Feed Units

for Drilling... Tapping... Reaming...
Hollow Milling and Deep Hole Drilling
Vertical, Horizontal or Angular Mounting

Units are universal in application... let us show you their application to your job.

Made in two sizes—No. 1 and No. 2 Morse Taper.

This simple unit gives high production at a lower cost. When used in multiples to complete operations, no relocation of part is necessary, thus producing more accurate work.

Semi-skilled operators will deliver high production accurately and efficiently, yet with a minimum of supervision.



Program of SNT Technical Papers—Continued

Wednesday, November 3—2:00 P.M.

Presentation of Awards

Chairman—Dr. Gerold H. Tenney, Los Alamos, Scientific Lab., National President.

Co-Chairmen—National Officers and Directors: W. C. Hitt, Douglas Aircraft Co., Vice-President; Philip D. Johnson, Secretary; Hamilton Migel, Magnaflux Corp., Treasurer; Dr. Robert C. McMaster, Battelle Memorial Institute, Director; George T. Taylor, Radium Chemical Co., Director; Richard F. Holste, General Electric Co., Director; Royal G. Tobey, Eastman Kodak Co., Director; and Wm. K. Lonsdale, James H. Herron Co., Director.

Mehl Honor Lecturer—Dr. E. E. Charlton, General Electric Co.

de Forest Award—Donald C. Erdman, Electro-Circuits Co.

Coolidge Award—(To Be Announced).

Thursday, November 4—9:00 A.M.

Nondestructive Testing as Applied to Airline, Railway, Oil and Shipbuilding

Chairman—A. S. Pedrick, Southern Pacific Railroad.

Co-Chairman—Geo. G. Thurston, Consulting Metallurgist, Orinda, California.

Discussions and Papers By—Robert E. Reynolds, Lockheed Aircraft Co.; Ray McBriar, Denver & Rio Grande RR; A. W. Gilbert, Carbide & Chemical Co.; A. K. Hutton, Newport News Shipbuilding and Dry Dock Co.



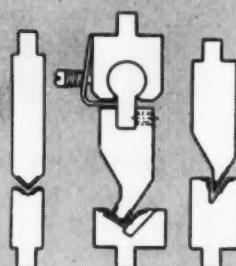
INDUCTION HARDENED PRESS BRAKE DIES

for greater die life at no extra cost
on any make of press brake

Whether it is a simple die for angle bending or the more complex dies for any of the combined bending and forming operations, CHICAGO induction-hardened dies offer bonus performance at no extra cost. Field reports on these dies show better than ten times the useful life of the conventional dies used in press brakes. Get the full particulars on CHICAGO dies for your next press brake job.

4915

Steel Bending Brakes for over 50 Years

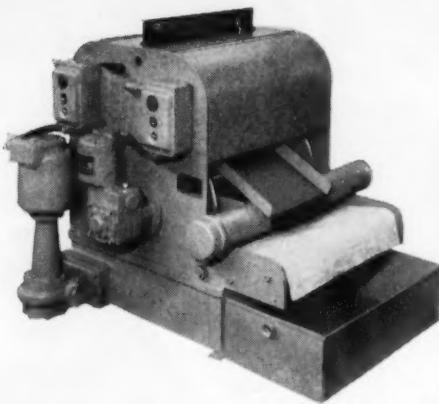


Heavy lines
indicate
hardened surfaces

DREIS & KRUMP
MANUFACTURING COMPANY

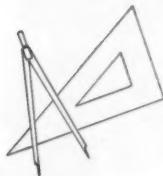
7418 S. Leemis Boulevard, Chicago 36, Illinois

CHICAGO
STEEL BENDING BRAKES
BOX AND PAN BRAKES
PRESS BRAKES



BARNESDRIL COOLANT SEPARATORS

ARE ENGINEERED TO YOUR NEEDS TO



- Increase Production
- Improve Finish
- Save Coolant
- Reduce Maintenance

Whatever your choice of coolant, it works better if it's clean. Finish is better . . . tools stay sharp longer . . . and there's no need to stop production to "clean house", every so often.

The simplest, most foolproof, most compact means of keeping coolants clean is a Barnesdril Filtration System.

It can be one or more individual units operating separately, or as a centralized installation handling an entire line. It may employ magnetic separation, fabric filtration, or a combination of both.

Whatever its nature, it can and should be engineered to your specific requirements, by experienced Barnesdril Filtration Engineers. They are "shirt-sleeves" operators . . . loaded with filtration know-how and backed-by laboratory analysis.

They can give you up to 99% removal of coolant contaminants, if necessary, so get the Barnesdril story first. Write or phone a Barnesdril Filtration Engineer today.

Kleenall Filters Are Plant Proven On Our Own Production Equipment



**FILTRATION DIVISION
BARNES DRILL CO.
860 CHESTNUT STREET • ROCKFORD, ILLINOIS**

WELDERS ALWAYS ASK:



"But is it
as good as
a Lincoln 'Shield-Arc'?"

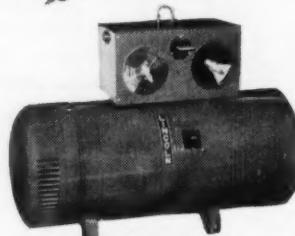


Here's why the Lincoln "Shield-Arc" welder is *the standard of comparison* for arc welders:

1. "Shield-Arc" delivers *any* type of direct current arc...not one or two types.
2. "Shield-Arc" delivers constant output of current, regardless of line voltage fluctuations.
3. "Shield-Arc" welders are constantly improved to weld faster...at lower and lower costs.



GET LATEST FACTS on cutting your welding costs. Send for Bulletin 459, available by writing on your letterhead to:



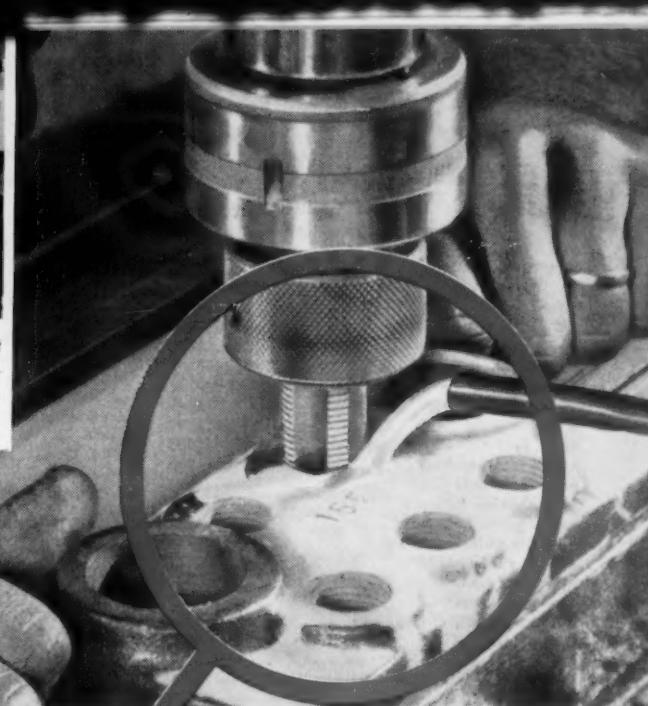
LINCOLN "Shield-Arc" SAE
DC MOTOR-GENERATOR WELDER
200-300-400-600-900 amps.

THE LINCOLN ELECTRIC COMPANY
DEPT. 3506 • CLEVELAND 17, OHIO

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT



Standard's lubrication specialist
J. E. Meyer, Jr., checks performance
in the Trane Company plant.



the thread of this story depends on . . .

■ The coils manufactured by the Trane Company, La Crosse, Wisconsin, are the heart of the heating and cooling equipment they produce. Threaded cast iron headers used in many of these coils require cleanly threaded and finished holes that must be absolutely rust-free. Up to 1936, various soluble oils had been tried but none successfully eliminated rusting. On the advice of a Standard Oil lubrication specialist a switch to SUPERLA Soluble Oil was made with marked success. With SUPERLA on the job, rejections due to rusting were completely eliminated. In addition, the quality of the threads has been superior.

SUPERLA Soluble Oil can help you find a happy solution to your lubrication problem.



For the help and advice of a Standard lubrication specialist call your nearby Standard Oil office or write: Standard Oil Company, 910 South Michigan, Chicago 10, Ill.



(Indiana)

STANDARD OIL COMPANY

List of Exhibitors

Company	Booth	Company	Booth		
A					
A B C Die Casting Mach. Co.	2030	Baker & Co., Inc.	1327		
A.I.T. Diamond Tool Co.	1658	Bakelite Div.	653		
Ace Drill Bushing Co., Inc.	2255	Baldwin-Lima-Hamilton	1065		
Acetogen Gas Co.	2147	Balteau Elec. Corp.	2246		
Acme Mfg. Co.	1640	Banner Mfg. Co.	1019		
Acme Steel Co.	2129	Baron Industries	2364		
Acme Tool Co.	1005	Bausch & Lomb Optical Co.	1242		
Action Diamond Tool Co.	1135	Bean & Co., Morris	2118		
Adamas Carbide Corp.	1411	Bell & Gossett Co.	441		
Air Reduction Sales Co.	341	Beryllium Corp.	1717		
Ajax Electric Co., Inc.	752	Binks Mfg. Co.	420		
Ajax Electrothermic Corp.	752	Black Drill Co.	1511		
Ajax Engineering Corp.	752	Blakeslee & Co., G. S.	1016		
Ajem Laboratories, Inc.	1145	Boice-Crane Co.	1729		
Ajusto Equipment Co.	1057	Brainard Steel Div.	1758		
Aldridge Industrial Oils, Inc.	1424	Brake Shoe & Casting Div.	762		
Al-Fin Div.	2070	Branson Instruments, Inc.	2244		
Allegheny Ludlum Steel Corp.	336	Bridgeport Brass Co.	1015		
Allis-Chalmers Mfg. Co.	242	Bristol Co.	1441		
Allison Co.	142	Bruning Co., Inc., Charles	1128		
Alloy Engr. & Casting Co.	1101	Brush Beryllium Co.	2348		
Alloy Metal Wire Co.	1645	Brush Electronics Co.	2317		
Alpha Metals, Inc.	2344	Brush Laboratories Co.	2317		
American Brake Shoe Co.	762	Buck Tool Co.	460		
American Cast Iron Pipe Co.	1020	Buehler, Ltd.	1239		
American Chain & Cable Co.	1228				
American Chemical Paint Co.	1036	C			
American Cyanamid Co.	132	Cambridge Wire Cloth Co.	1646		
American Cystoscope Makers, Inc.	2323	Cam-Lok Div.	1056		
American Gas Ass'n	843-I, 854-D	Campbell Machine Div.	1228		
American Gas Furnace Co.	843-H	Carbide & Carbon Chemical Co.	653		
American Machine & Metals, Inc.	1248	Carbolyt Dept.	1540		
American Manganese Steel Div.	762	Casting Engineers, Inc.	1746		
American Marietta Co.	1618	Centri-Spray Corp.	1745		
American Metal Market	1549	Challenge Machinery Co.	2130		
American Nickelsid Co.	2314	Chase Brass & Copper Co.	302		
American Optical Co.	2229	Chicago Rivet & Machine Co.	1623		
American Pullmax Co., Inc.	1253	Chicago Screw Co.	2223		
American Society for Metals	603	Chilton Co.	2155		
American Wheelator & Equip. Corp.	632	Chrysler Corp.	1335		
Amplex Div.	1335	Cincinnati Sub-Zero Products Co.	1630		
Applied Research Labs.	1342	Circo Equip. Co.	225		
Arcair Co.	1445	Cities Service Oil Co.	1216		
Aronson Machine Co.	2354	Clementina, Ltd.	1002		
Arwood Precision Casting Corp.	1254	Clevite Corp.	2317		
Ashworth Bros. Inc., Metals Div.	1723	Climax Molybdenum Co.	148		
Atlas Press Co.	2057	Cold Metal Products	141		
Atomic Energy of Can. Ltd.	2040	Commander Mfg. Co.	1309		
Automotive Industries	2155	Commercial Filters Corp.	1530		
Avon Tube Div.	1939	Consolidated Industries, Inc.	1524		
		Consolidated Vacuum Corp.	2156		
Babcock & Wilcox Co.	236	Continental Industrial Engineers, Inc.	843-G		
Baird Associates, Inc.	1348	Cooley Electric Mfg. Corp.	1649		
		Crane Packing Co.	136		

B

Babcock & Wilcox Co.	236
Baird Associates, Inc.	1348

Company	Booth	Company	Booth		
D					
Dake Engine Co.	1749	Electro Arc Mfg. Co.	1465		
Dean Products, Inc.	1401	Electro Circuits, Inc.	2136		
Delaware Tool Steel Corp.	2322	Electro Metallurgical Co.	653		
Delta Power Tool Div.	1053	Elox Corp. of Michigan	1612		
DeSanno & Son, Inc., A. P.	2139	Empire Products, Inc.	1056		
Defrex Corp.	1365	Enamelstrip Corp.	346		
Detroit Testing Machine Co.	1148	Engineered Casting Div.	762		
Diamond Mach. Tool Co.	1260	Engis Equipment Co.	1629		
Diamond Power Specialty Corp.	2140	Erico Products, Inc.	1429		
Die Casting	1055	Esbenson Co., Iver J.	2340		
Dings Magnetic Separator Co.	1316	Exomet, Inc.	1539		
Diversey Corp.	1718	Expert Die & Tool Co.	1330		
Doehler-Jarvis Corp.	260	Expert Welding Machine Co.	1330		
Dow Chemical Co.	620				
Dow Furnace Co.	1041	F			
Dreis & Krump Mfg. Co.	458	Fairchild Engine & Appliance Corp.	2270		
Driver Co., Wilbur B.	2029	Fansteel Metallurgical Corp.	1559		
Driver-Harris Co.	2267	Fawick Airflex Div.	1567		
Dumore Co.	1407	Ferner Co., Inc., R. Y.	1247		
DuPont de Nemours & Co., Inc., E. I.	2050	Ferrotherm Co.	2247		
E		Firth Sterling, Inc.	315		
East Shore Machine Products Co.	1448	Flexonics Corp.	1555		
Eclipse Fuel Engr. Co.	854-D	Flow	1055		
Elastic Stop Nut Corp. of America	2023				
Electric Arc, Inc.	2102	G			
Electric Furnace Co.	636	Gaertner Scientific Corp.	2334		
Electro-Alloys Div.	762	Gas Appliance Service, Inc.	854-A		
		Gas Machinery Co.	854-C		
		General Alloys Co.	652		

SET OF 14 Nicholson Mandrels

Takes Every Size Bore $\frac{1}{2}$ " to 7"



Actually 209 solid arbors would be required to fit all bores between $\frac{1}{2}$ " and 7", advancing by $\frac{1}{32}$ ". But 14 Nicholson Expanding Mandrels will accommodate this entire range, and all in-between sizes as well. Hard-

ened tool steel. Sold singly or in sets. The standard in shops the nation over. BULLETIN 653 shows how to save time, promote precision with these widely used tools.

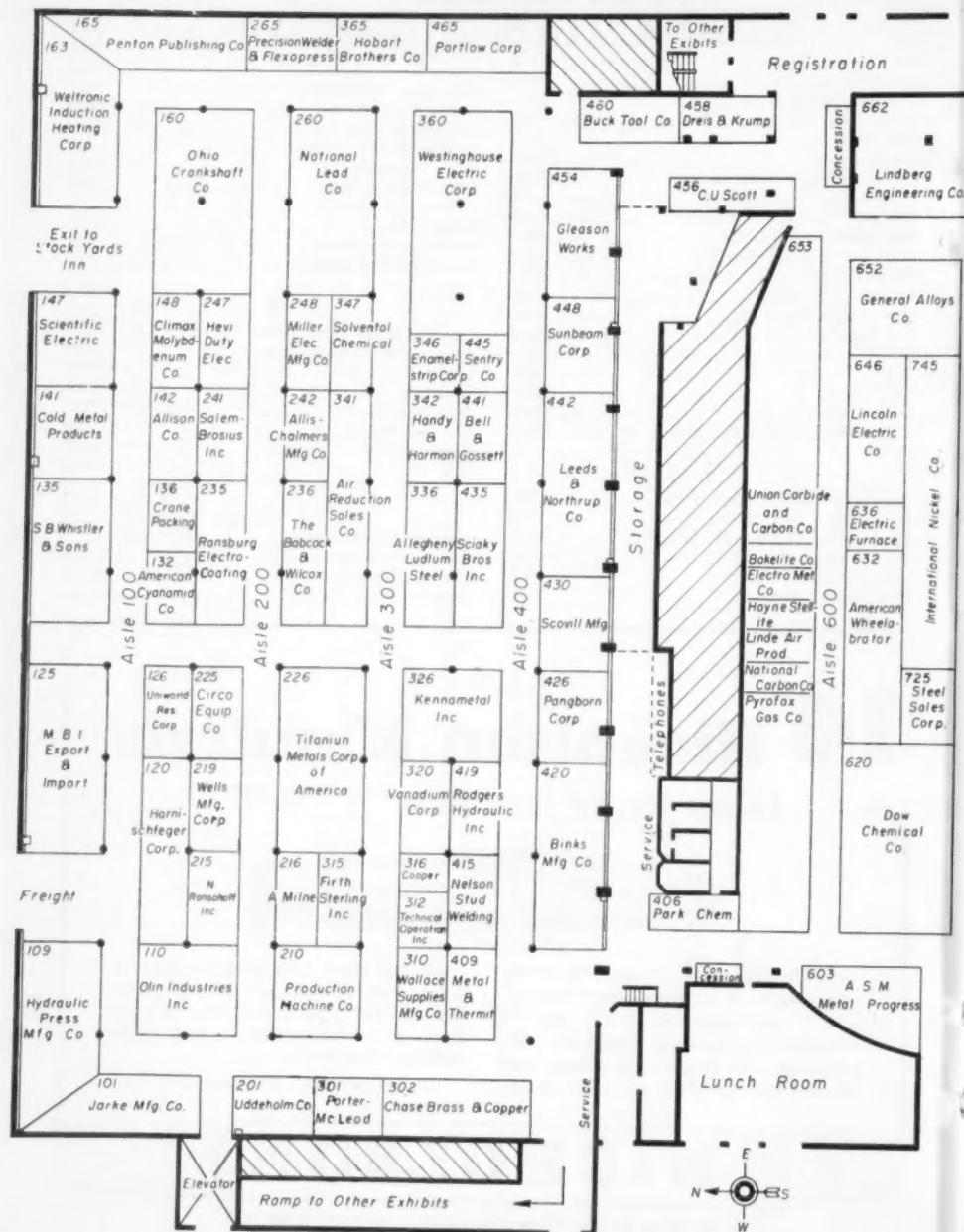
136 Oregon St., Wilkes-Barre, Pa.

W. H.

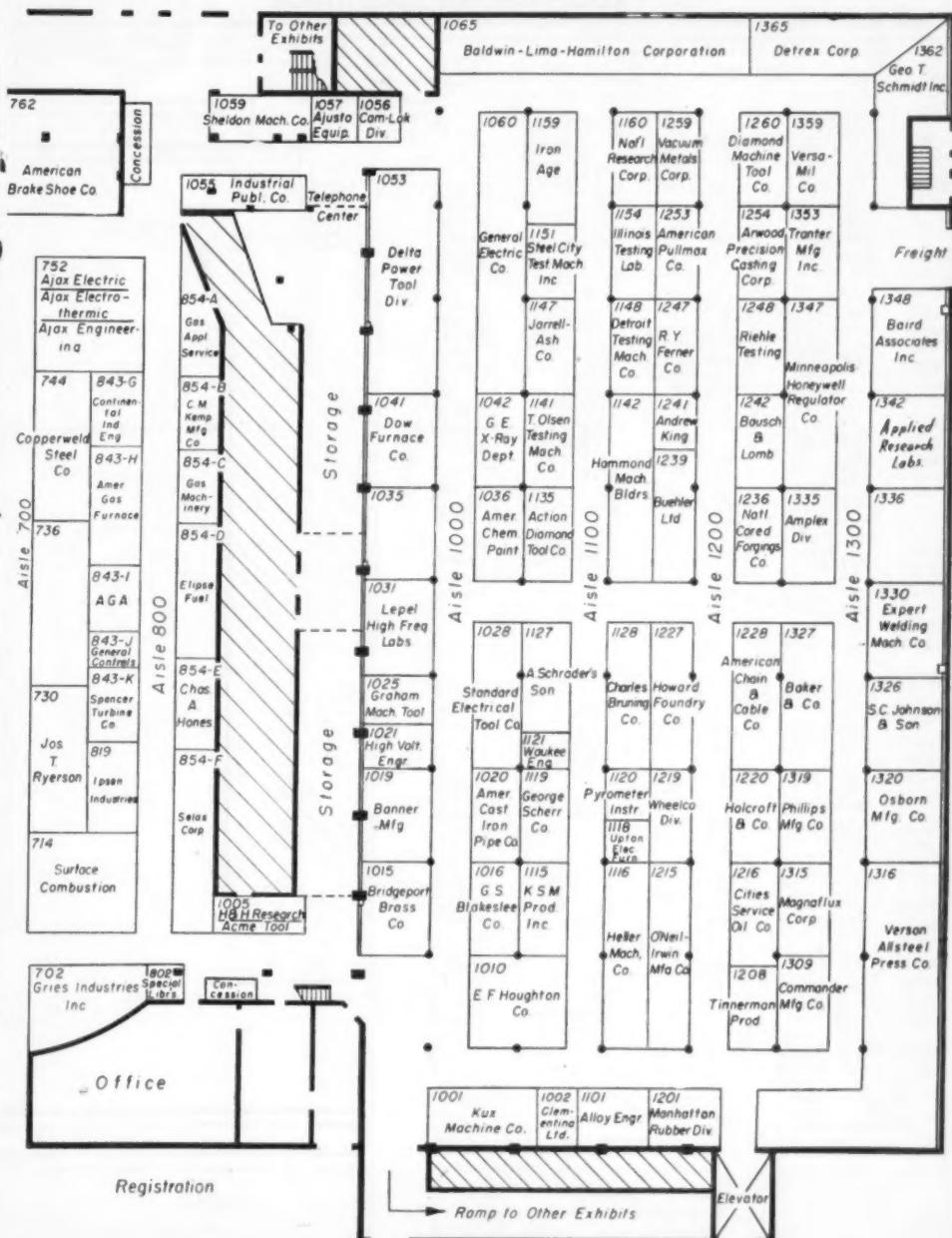
NICHOLSON & CO.

TRAPS · VALVES · FLOATS

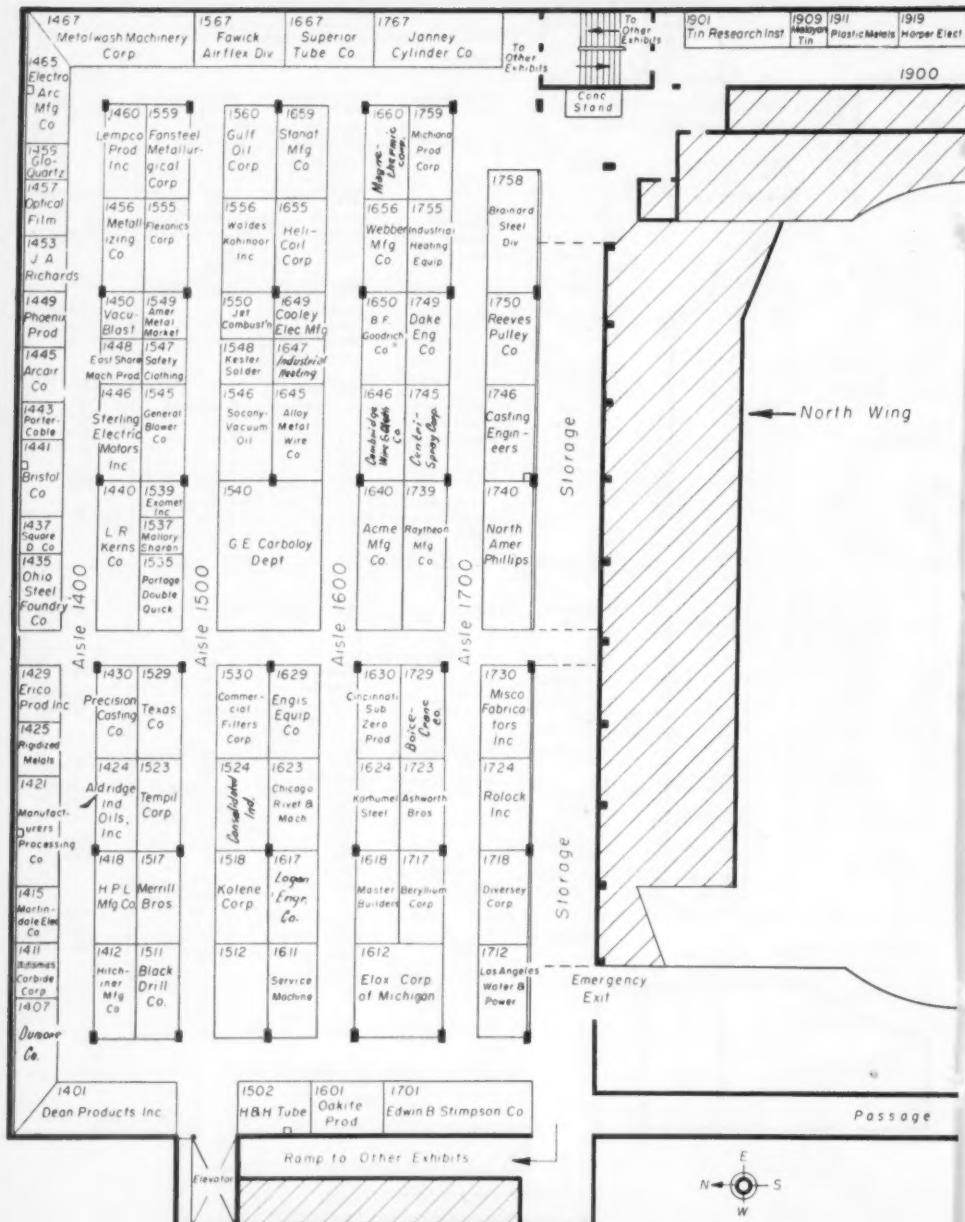
NORTH HALL FIRST FLOOR PLAN



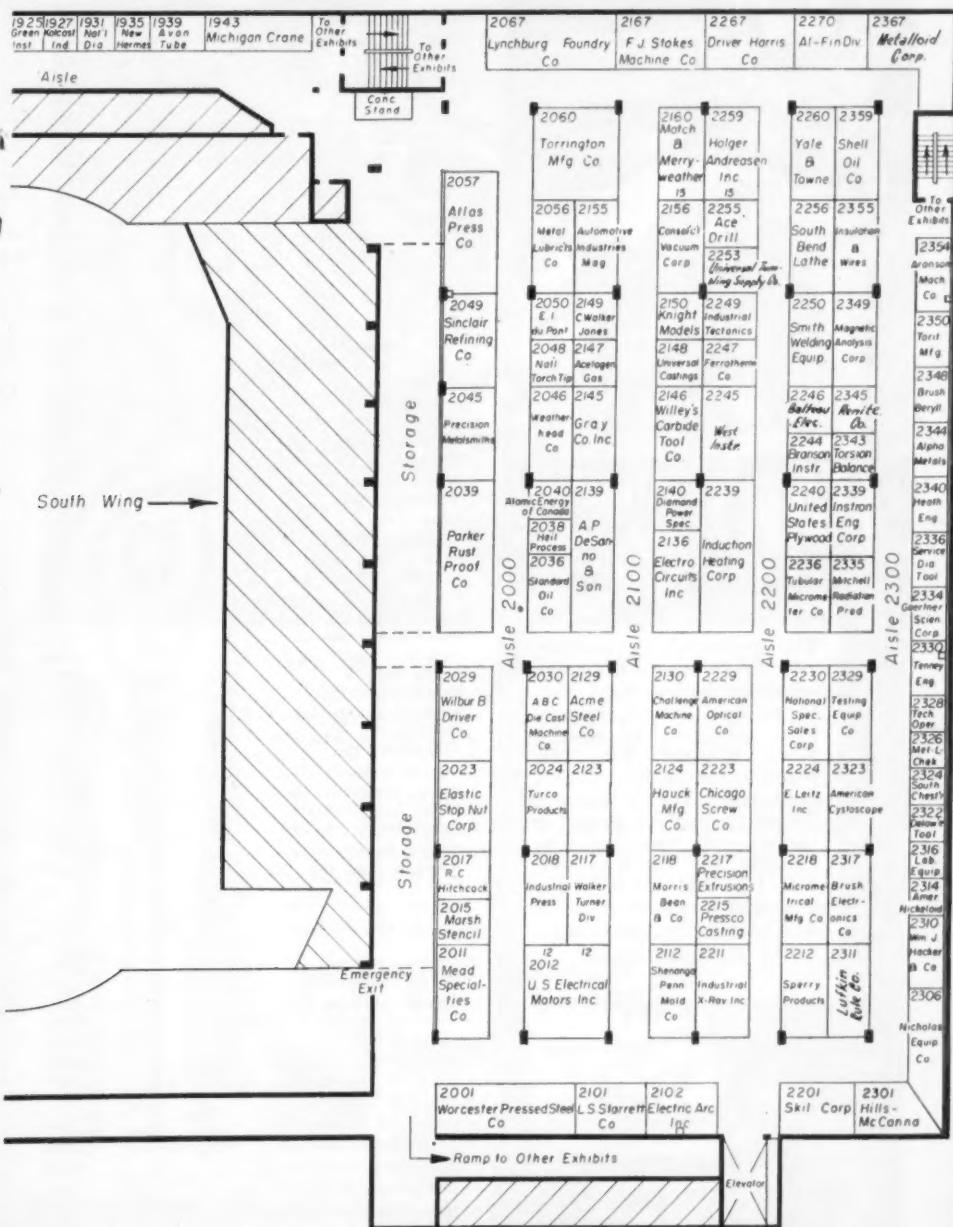
SOUTH HALL FIRST FLOOR PLAN



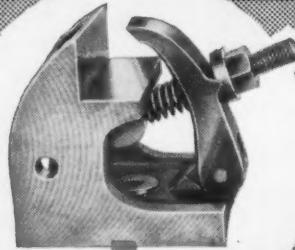
NORTH HALL SECOND FLOOR PLAN



SOUTH HALL SECOND FLOOR PLAN



SAVE the expense
of special jigs, fixtures —
Save set-up time, too!



HART MILLING FIXTURES

"Masters of A Thousand Set-ups"

The inexpensive, versatile answer to many different set-up problems. Hart Fixtures hold round, hexagonal, octagonal or square stock aligned with the machine, on miller, shaper, drill press and tapper. Value proved for years in large and small shops; famous for key-way set-ups. Usually sold in pairs; four sizes, capacity $\frac{1}{2}$ " to $4\frac{1}{2}$ ", can be used horizontally or vertically.

WRITE FOR
ILLUSTRATED
FOLDER



WALTER W. FIELD & SON, INC.
39 Hayward St., Cambridge 42, Mass.

Company	Booth
General Blower Co.	1545
General Controls Co.	843-J
General Elec. Co.	1060, 1540, 1042
General Metals Div.	260
Gleason Works	454
Glo-Quartz Elec. Heater Co., Inc.	1459
Goodrich Co., B. F.	1650
Graham Machine Tool Co.	1025
Gray Co., Inc.	2145
Green Instrument Co., Inc.	1925
Gregory Industries, Inc.	215
Gries Industries, Inc.	702
Gulf Oil Corp.	1560

H

H & H Research Co.	1005
H & H Tube & Mfg. Co.	1502
HPL Mfg. Co.	1418
Hacker & Co., Inc., Wm. J.	2310
Hammond Machinery Builders, Inc.	1142
Handy & Harman	342
Harnischfeger Corp.	120
Harper Electric Furnace Corp.	1919
Hauck Mfg. Co.	2124
Haveg Corp.	1725
Haynes Stellite Co.	653
Heath Engr. Co.	2340
Heil Process Equip. Corp.	2038
Heil-Coil Corp.	1655
Heller Machine Co.	1116
Heston & Anderson Co.	310
Hevi Duty Electric Co.	247
Higbie Mfg. Co.	1939
Hills-McCanna Co.	2301
Hitchcock & Sons, Inc., R. C.	2017
Hitchiner Mfg. Co., Inc.	1412
Hobart Bros. Co.	365
Holcroft & Co.	1220
Holger Andreasen, Inc.	2259
Hones, Inc., Charles A.	854-E
Houghton Co., E. F.	1010
Howard Foundry Co.	1227
Hydraulic Press Mfg. Co.	109

I

Industrial Heating	1647
Illinois Testing Labs.	1154
Induction Heating Corp.	2239
Industrial Heating Equipment Co.	1755
Industrial Press	2018
Industrial Publishing Co.	1055
Industrial Tectonics, Inc.	2249
Industrial X-Ray, Inc.	2211
Industry & Welding	1055
Instron Engr. Corp.	2339
Insulation & Wires, Inc.	2355
International Nickel Co., Inc.	745
Ipsen Industries, Inc.	819
Iron Age	1159

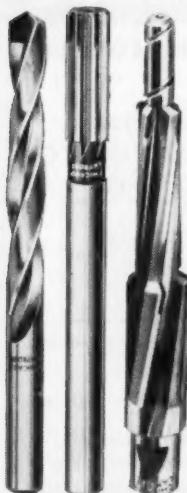
Magnify
your
cutting
mileage

Double-Circle Carbide Tipped Tools



An enlarged view of Double-Circle carbide inserts can only give you a minor part of the story of their cutting magic. These splendid tools have a "beneath-the-surface" story that is the true key to their superiority. In a word, this is the vast experience of Chicago-Latrobe in cutting tool engineering, in selection and testing of materials and in precision manufacturing methods. It is not surprising that wise buyers everywhere look to Chicago-Latrobe's complete line for the tools that make cutting operations faster, smoother, easier. For greater cutting mileage, always specify Double-Circle carbide tipped drills and reamers.

YOU'LL GET  QUICK SERVICE 
FROM A CHICAGO-LATROBE DISTRIBUTOR



CHICAGO-LATROBE

419 W. ONTARIO ST. CHICAGO 10

DRILLS • REAMERS • COUNTERSINKS • COUNTERBORES • CARBIDE TOOLS • SPECIAL TOOLS

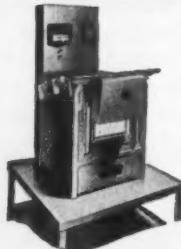
Company	Booth	Company	Booth
	J		
Janney Cylinder Co.	1767	Lempco Products, Inc.	1460
Jarke Mfg. Co.	101	Lepel High Frequency Labs.	1031
Jarrell-Ash Co.	1147	Lincoln Electric Co. ....	.646
Jet Combustion, Inc.	1550	Lindberg Engr. Co. ....	.662
Johnson & Son, Inc., S. C.	1326	Linde Air Products Co. ....	.653
Jomac, Inc.	2149	Livingston Tool Co. ....	.310
Jones Co., C. Walker	2149	Logan Engr. Co. ....	.1617
		Lufkin Rule Co. ....	.2311
		Lynchburg Fdry. Co. ....	.2067

K		M	
K S M Products Inc.	1115	M. B. I. Export & Import Ltd. ....	.125
Kearney & Trecker Corp.	2117	Machinery ....	.2018
Kemp Mfg. Co., C. M.	854-B	Magnaflux Corp. ....	.1315
Kennametal, Inc.	326	Magnethermic Corp. ....	.1660
Kennecott Copper Corp.	302	Magnetic Analysis Corp. ....	.2349
Kent Cliff Laboratories Div.	2343	Malayan Tin Bureau ....	.1909
Kerns Co., L. R.	1440	Mallory-Sharon Titanium Corp. ....	.1537
Kester Solder Co.	1548	Manhattan Rubber Div. ....	.1201
King, Andrew	1241	Manufacturers Processing Co. ....	.1421
Knight Models, Inc.	2150	Marsh Stencil Machine Co. ....	.2015
Kolcast Industries, Inc.	1927	Martindale Elec. Co. ....	.1415
Kolene Corp.	1518	Master Builders Co. ....	.1618
Korhumel Steel & Aluminum Co.	1624	Mead Specialties Co. ....	.2011
Kux Machine Co.	1001	Merrill Brothers ....	.1517
		Metal Lubricants Co. ....	.2056
L		Metal Progress ....	.603
Laboratory Equipment Co.	2316	Metal Removal Co. ....	.235
Leeds & Northrup Co.	442	Metal & Thermit Corp. ....	.409
Leitz, Inc., E.	2224	Metallizing Co. of America ....	.1456

COOLEY HEAT TREATING FURNACES

ELECTRIC BOX TYPE • FLOOR AND BENCH MODELS
For Tools and Small Parts

SHOWN HERE THE COOLEY BENCH MODEL
for HARDENING AND TEMPERING



Max. Temp.	Sizes	Price
1850°	8" x 6" x 14"	
	10" x 6" x 18"	
	10" x 8" x 18"	\$255 to
2000°	8" x 6" x 14"	
	10" x 6" x 18"	\$655

All prices are less controls. Any standard controls available for automatic temperature control.

- Available with hinged or vertical lift door.
- Heating elements fully protected from mechanical or atmospheric destruction.

Controlling Pyrometers carried in stock—available for all applications.

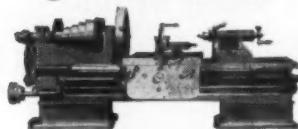
Free on request: COMPLETE CATALOG "SHOP NOTES ON HEAT TREATING"

COOLEY

ELECTRIC MANUFACTURING CORP.

34 SO. SHELBY • INDIANAPOLIS, IND.

IN
1895

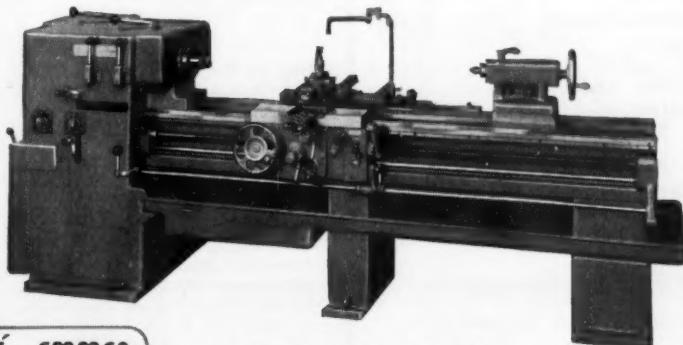


BOYÉ & EMMES
LONG LIFE
ENGINE LATHES
looked like this!

...In that year the Boyé & Emmes design featured a single back gear, which doubled the number of spindle speeds previously considered adequate.

Today BOYÉ & EMMES LONG LIFE ENGINE LATHES

incorporate the accumulated know-how of fifty-nine
consecutive years of exclusive engine lathe manufacture.



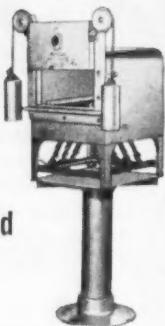
BOYÉ & EMMES
MACHINE TOOL COMPANY
123 CALDWELL DRIVE
CINCINNATI 16, OHIO
MACHINE TOOL CENTER of the WORLD

For full information about Boyé & Emmes extended range of spindle speeds and other modern design changes write for FREE Bulletin 5305. Ask also for our new folder "Fifty-Nine Years of Engine Lathe Evolution."

FLEXIBILITY

FOR A WIDE RANGE OF JOBS

THE
JOHNSON 706
HARDENING,
TEMPERING and
ANNEALING
FURNACE



Select any temperature you require from 300° to 1875° F. Get clean, uniform heat at low cost. The Johnson 706 is easily regulated. Six direct jet bunsen burners have separate valves and pilot lights. Firebox 7 x 13 x 16½ lined with high temperature refractory. Counterbalanced door opens upwards.

No. 706 Pedestal (illustrated) -----	\$300.00
No. 706 Bench -----	\$275.00
No. 654 with 5 x 7½ x 13½ firebox:	
Pedestal -----	\$163.00
Bench -----	\$138.00

All Prices F.O.B. Factory. Order Now!

JOHNSON GAS APPLIANCE CO.
571 E AVE. N.W., CEDAR RAPIDS, IA.

JOHNSON
FURNACES FOR INDUSTRY

Company	Booth
Metalloid Corp.	2367
Metalwash Machinery Corp.	1467
Met-L-Chek Co.	2326
Michiana Products Corp.	1759
Michigan Crane & Conveyor Co.	1943
Michigan Steel Casting Co.	1730
Micrometrical Mfg. Co.	2218
Miller Electric Mfg. Co.	248
Milne & Co., A.	216
Minneapolis-Honeywell Regulator Co.	1347
Misco Fabricators, Inc.	1730
Mitchell Radiation Products Corp.	2335
Motch & Merryweather Machinery Co.	2160

N

National Bearing Div.	762
National Carbon Co.	653
National Cored Forgings Co., Inc.	1236
National Diamond Laboratory	1931
National Industrial Publishing	1647
National Lead Co.	260
National Radiator Co.	1911
National Research Corp.	1160
National Spectrographic Sales Corp.	2230
National Torch Tip Co.	2048
Nelson Stud Welding Div.	215
New Hermes Engraving Machine Corp.	1935
Nicholas Equipment Co.	2306
North American Philips Co., Inc.	1740

O

Oakite Products, Inc.	1601
Ohio Crankshaft Co.	160
Ohio Seamless Tube Div.	744
Ohio Steel Foundry Co.	1435
Olin Industries, Inc.	110
Olsen Testing Machine Co., Tinus	1141
O'Neil-Irwin Mfg. Co.	1215
Optical Film Engr. Co.	1457
Osborn Mfg. Co.	1320

P

Pangborn Corp.	426
Park Chemical Co.	406
Parker Appliance Co.	310
Parker Rust Proof Co.	2039
Partlow Corp.	465
Penton Publishing Co.	165
Phillips Mfg. Co.	1319
Phoenix Products Co.	1449
Portage Double Quick Tool Co.	1535
Porter Co., H. K.	1645
Porter-Cable Machine Co.	1443
Porter-McLeod Machine Co.	301
Powdered Metal Products Div.	2260
Precision Castings Co., Inc.	1430
Precision Extrusions	2217
Precision Metalsmiths, Inc.	2045
Precision Welder & Flexopress Corp.	265
Pressco Casting & Mfg. Corp.	2215
Production Machine Co.	210
Pyrofax Gas Corp.	653
Pyrometer Instrument Co., Inc.	1120



**FLEXIBLE
SHAFT
MACHINES...
versatile
finishing
facilities—
no costly fixed equipment!**



Strandflex

You can grind, rotary file, wire brush, buff, polish and do many other preparation and finishing jobs with a single, portable machine when you install Strand Flexible Shaft Machines. Just change the tool to change the job. And changing tools is easy with Strand because the new Strand Quick Change Coupling eliminates threads, nuts, wrenches. Lock-button design does the trick—in seconds!

Operating speeds from 850 to 12000 RPM are available in the famous Strandflex 4 & 5-Speed Gear Drive Machines, powered up to 1 HP...and you can select your operating speed without changing pulleys or belts, without using tools. New Strand High Speed Gear Attachment gives operating speeds up to 27000 RPM, suitable for high speed steel or carbide cutters . . . by tripling the rated spindle speed.

Best of all—you are assured of better workmanship, higher output, less operator fatigue, because the operator lifts only the tool—not the heavy, bulky motor. And your Strand machine is *portable*—take it to any part of the plant where the work can be done best.

FREE CATALOG illustrates and describes all Strand units, including Strandflex machines, as well as conventional Direct Drive and Counter-shaft machines with up to 3 HP motors. See your Strand Distributor or write today for Catalog 331-A.



**FRANKLIN BALMAR
CORPORATION**

N. A. STRAND DIVISION
Woodberry, Baltimore 11, Maryland
5001 N. Wolcott Ave., Chicago 40, Ill.

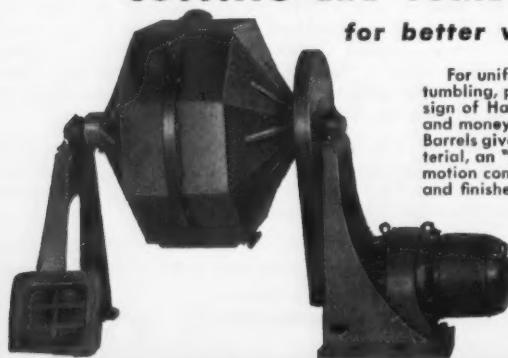


Company	Booth	Company	Booth
R			
Ransburg Electro-Coating Corp.	235	Sentry Co.	445
Ranshoff, Inc., N.	215	Service Diamond Tool Co.	2336
Raybestos-Manhattan, Inc.	1201	Service Machine Co.	1611
Raytheon Mfg. Co.	1739	Sharon Steel Corp.	1758
Reeves Pulley Co.	1750	Sheldon Machine Co., Inc.	1059
Renite Co.	2345	Shell Oil Co.	2359
Richards Co., J. A.	1453	Shenango-Penn Mold Co.	2112
Riehle Testing Machines Div.	1248	Sinclair Refining Co.	2049
Rigidized Metals Corp.	1425	Skil Corp.	2201
Rockwell Mfg. Co.	1053	Smith Welding Equipment Corp.	2250
Rodgers Hydraulic, Inc.	419	Socony-Vacuum Oil Co., Inc.	1546
Rolock, Inc.	1724	Solventol Chemical Products, Inc.	347
Ryerson & Son, Inc., Jas. T.	730	South Bend Lathe Works	2256
S			
"S" Corrugated Quenched Gap Co.	147	South Chester Corp.	2324
Safety Clothing & Equipment Co.	1547	Southco Div.	2324
Salem-Brosius, Inc.	241	Special Libraries Assoc.	802
Schenck, Carl	1247	Spencer Turbine Co.	843K
Scherr Co., Inc., Geo.	1119	Sperry Products, Inc.	2212
Schmidt, Inc., Geo. T.	1362	Square D Co.	1437
Schnell Tool & Die Corp.	2241	Stanat Mfg. Co.	1659
Schrader's Son, A.	1127	Standard Electrical Tool Co.	1028
Sciaky Bros., Inc.	435	Standard Oil Co. of Indiana	2036
Scientific Electric	147	Starrett Co., L. S.	2101
Scott & Son, Inc., C. U.	456	Steel	165
Scovill Mfg. Co.	430	Steel City Testing Machines, Inc.	1151
Selas Corp. of America	854F	Steel Sales Corp.	725
		Sterling Electric Motors, Inc.	1446
		Stimpson Co., Inc., Edwin B.	1701
		Stokes Machine Co., F. J.	2167
		Sub-Zero Products Co.	1630

HARTFORD TRIPLE ACTION

CUTTING and TUMBLING BARRELS

for better work in less time!



For uniform cutting down, wet or dry grinding, tumbling, pulverizing and mixing, the unique design of Hartford Triple Action Barrels saves time and money and produces better results. Hartford Barrels give a TRIPLE ACTION in tumbling the material, an "over and over, end to end, folding-in" motion combined, which quickly grinds off burrs, and finishes and smooths the general surface of any article in the load. These barrels are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burnishing balls scientifically correct in design and material for each specific job. Bulletin on request.

2HS52R

DETROIT 2 W. S. TURNER 446 NEW CENTER BLDG.	THE HARTFORD STEEL BALL CO. Hartford 6, Connecticut	LOS ANGELES 15 E. D. MALIBY CO. 1718 SOUTH FLOWER ST.
WICHITA 1, KAN. A. E. WERNER ORPHEUM BLDG.	CHICAGO 6 VICTOR R. CLARK 605 W. WASHINGTON BLVD.	NEW YORK DISTRICT NEWARK 2 1060 BROAD ST. KANSAS CITY 8, MO. T. R. WHITE 1919 BALTIMORE AVE. EXPORT OFFICE R. A. RODRIGUEZ, INC. 55 W. 42 ND ST., NEW YORK 18

new Portable BAND SAW!

Cuts metal 15 times faster
than a hack saw!



Porter-Cable
PORTA-BAND
Model 524

\$215

Cuts through 1½" cold rolled steel in
41 secs.! That's 15 times faster than a hand
hack saw... 2½ times faster than larger
power hack saws!



Take Porta-Band anywhere—
around the plant, in stock
bins, to equipment yards, out
in the field. Portable, compact,
light — perfect for general
maintenance or teardowns.



In tight, awkward spots like
this, Porta-Band delivers
smooth, controlled sawing in
any position — eliminates fa-
tigue — cuts costs.



Cuts ferrous and non-ferrous
metals, "problem" materials,
in bar, angle or strip form.
Powered for heavy duty . . .
handles toughest jobs.

Porter-Cable

Quality Electric Tools

MAIL COUPON
FOR
COMPLETE
INFORMATION

PORTER-CABLE MACHINE CO.

2311 N. Salina St., Syracuse 8, N. Y.

(In Canada, send to Strongbridge, Ltd., London, Ont.)

Send full information on PORTA-BAND and name of nearest
dealer.

Name _____

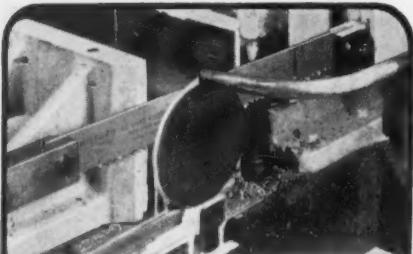
Company _____

Type of Business _____

Street _____

City _____ County _____ State _____

Manufacturers of Speedmatic and Guild Electric Tools



TO CUT COSTS when **CUTTING METALS** Consider these Facts

When you buy machine tools, it's not the initial cost that counts — it's the production these tools deliver! And with metal-cutting saw blades, it's the performance . . . the quality of the sawing . . . the life of the blade that determines the true value of the purchase.

But, in the final analysis, the proof of product superiority is found only by use in your plant with your materials and equipment. Your nearby MILFORD Distributor is ready to arrange a demonstration for you. Contact him, or write to the factory — today.

Profile Blades and Band Saw Blades, Hand and Power Hack Saw Blades

THE HENRY G. THOMPSON & SON CO. *Saw Blade Specialists for Over 75 Years*

NEW HAVEN 5, CONNECTICUT

- Please send the MILFORD Metal Cutting Catalog.
- I would like a MILFORD demonstration in my plant.

NAME _____

POSITION _____

COMPANY _____

CO. ADDRESS _____

CITY _____ ZONE _____ STATE _____

SOLD THROUGH SELECT INDUSTRIAL DISTRIBUTORS

Company	Booth
Sunbeam Corp.	448
Superior Tube Co.	1667
Surface Combustion Corp.	714

T

Taco West Corp.	2245
Technical Operations, Inc.	312
Tempil Corp.	1523
Tenney Engr., Inc.	2330
Testing Equip. Co., Inc.	2329
Texas Co.	1529
Tinnerman Products, Inc.	1208
Tin Research Institute, Inc.	1901
Titanium Alloy Mfg. Div.	260
Titanium Metals Corp. of America	226
Tocco Div.	160
Torit Mfg. Co.	2350
Torrington Mfg. Co.	2060
Torsion Balance Co.	2343
Tranter Mfg. Inc.	1353
Tubular Micrometer Co.	2236
Turco Products, Inc.	2024

U

Uddeholm Co. of America, Inc.	201
Union Carbide & Carbon Corp.	653
U. S. Electrical Motors, Inc.	2012
United States Plywood Corp.	2240
Universal Castings Corp.	2148
Universal Tumbling Supply Co.	2253
Uniworld Research Corp. of America	126
Upton Electric Furnace Co.	1118
Ulica Drop Forge & Tool Co.	233

V

Vacu-Blast Co., Inc.	1450
Vacuum Equipment Dept.	2156
Vacuum Metals Corp.	1259
Vanadium Corp. of America	320
Versa-Mill Co.	1359
Verson Allsteel Press Co.	1316
Volz Machinery Co., H. J.	2256

W

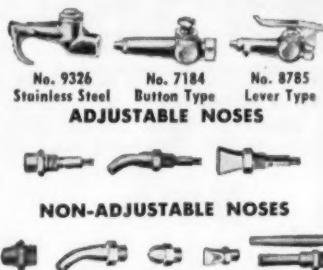
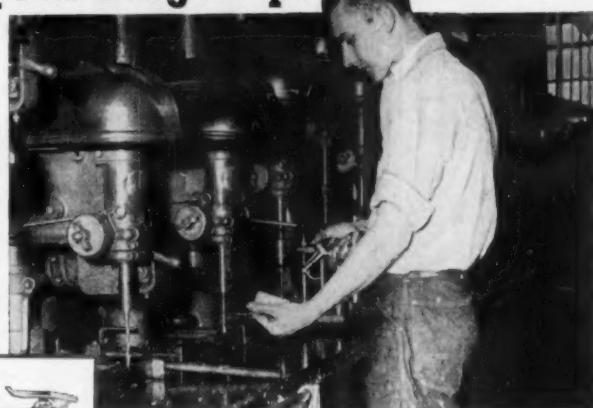
W. W. Alloys, Inc.	1559
Waldes Kohnoor, Inc.	1556
Walker-Turner Division	2117
Wallace Supplies Mfg. Co.	310
Waukeen Engr. Co.	1121
Weatherhead Co.	2046
Webber Mfg. Co., Inc.	1656
Wells Mfg. Corp.	219
Weltronic Induction Heating Corp.	163
West Instrument Corp.	2245
Westinghouse Electric Corp.	360
Wheelco Instrument Div.	1219
Whistler & Sons, Inc., S. B.	135
Willey's Carbide Tool Co.	2146
Wilson Mechanical Instrument Div.	1228
Worcester Pressed Steel Co.	2001

Y

Yale & Towne Mfg. Co.	2260
----------------------------	------

Put air at your fingertips with a

Schrader Blow Gun



Choose the Blow Gun that suits you best from the thirty-six designs and styles of Schrader Blow Guns available. The interchangeable adjustable and non-adjustable nozzles also available make Schrader Blow Guns the most versatile you can buy.

Schrader

REG. U. S. PAT. OFF.

Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets • Blow Guns • Air Line Couplers • Air Hose & Fittings • Hose Reels • Pressure Regulators & Oilers • Air Strainers • Uniflare Tube Fittings • Hydraulic Gauges

You'll find there are Schrader Blow Guns that *just suit* any operation you may have . . . reliably and economically. The #9326 Schrader Blow Gun shown here, for instance, will take the toughest treatment.

- **It's rugged**, both in design and construction. It is drop forged of stainless steel to give years of service. It has a countersunk nose and shielded operating button.
- **It's convenient** — Notice the handy hang-up hook. Hang the gun close to where you need it . . . and remember, this hook acts as a guard, to keep hands away from moving parts.
- **It's economical** — Any Schrader Blow Gun shuts off tightly the instant you lift your finger—delivers air only while it's needed.
- **Thirty-six** designs and styles of Schrader Blow Guns — drop forged stainless steel or brass . . . button type . . . lever type . . . adjustable nose . . . flexible nozzle . . . angle nozzle are available

You'll get facts by return mail. Fill out the coupon.

products

control the air

Mail This Coupon Today

A. SCHRADER'S SON

DIVISION OF SCOVILL MFG. COMPANY, INC.
461 Vanderbilt Avenue, Brooklyn 38, N. Y., Dept. G-6

I am interested in more information on . . .

Name _____ Title _____

Company _____

Address _____



du MONT
Square and Rectangular
Super High Speed Ground

TOOL BITS
 are

BALANCED
to do most for you

- more cuts per bit and per dollar
- a keener cutting edge
- longer life

TRY 'EM

Make your own performance tests and cost comparisons and you'll end up buying du Mont Bits.

Write for FREE Comparison Chart, Size and Price List S-1

The du MONT Corporation
 Greenfield, Massachusetts

Important Meeting Dates

November 4-7

National Tool & Die Manufacturers Association, Annual Convention, Dayton Biltmore Hotel, Dayton, Ohio. Association headquarters: 970 Public Square Bldg., Cleveland 13, Ohio.

November 8-12

National Electrical Manufacturers Association, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N.J. Association headquarters: 155 E. 44th St., New York 17, New York.

November 8-12

Montreal Industrial Tool and Equipment Show, The Show Mart, Berri Square, Montreal. Show offices: 4585 Sherbrooke St., W., Montreal, and 19 Melinda St., Toronto, Canada.

November 11-12

Gray Iron Founders' Society, Inc., Annual Meeting, The Homestead, Hot Springs, Va. Society headquarters: National City-E. 6th Bldg., Cleveland 14, Ohio.

November 15-17

American Standards Association, Fifth National Conference on Standards, Hotel Roosevelt, New York City. Association headquarters: 70 E. 45th St., New York 17, New York.

November 28-December 3

American Society of Mechanical Engineers, Annual Meeting, Statler Hotel, New York. Society headquarters: 29 W. 39th St., New York City, New York.

November 29-December 2

First International Automation Exposition, 244 Regiment Armory, New York City. Information: 845 Ridge Ave., Pittsburgh 12, Pennsylvania.

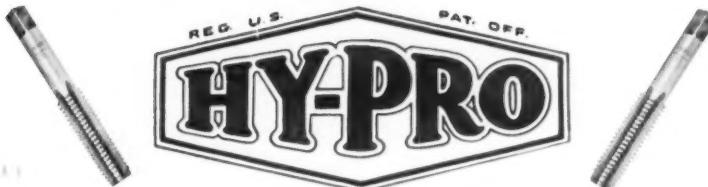
TAP DESIGN IS SPECIALIZED

AT HY-PRO

...to help boost your output

Tap design is specialized at Hy-Pro. In fact their whole operation is concentrated on the development and production of this one important line. Toward this end Hy-Pro's design engineers center their attention on developing the most efficient and economical taps for the jobs you need. Their success in this field can be judged by Hy-Pro's established reputation as "the tap specialists."

Whatever your own tap needs may be, let Hy-Pro help you boost production. Contact your local distributor or call Hy-Pro direct. They offer you a full line of quality taps plus the experience of specialized design engineers.



HY-PRO TOOL CO., NEW BEDFORD, MASS., U. S. A.
DISTRIBUTORS IN ALL LEADING CITIES

**ADDITIONAL
WAREHOUSES:**

6046 COLLEGE AVE.
OAKLAND 18, CALIF.
FIEDMONT 5-4337

10428 W. McNICHOLS RD.
DETROIT 21, MICH.
UNIVERSITY 4-1077

6141 NORTH ELSTON AVE.
CHICAGO, ILL.
NEWCASTLE 1-6486

109 EDISON PL.
NEWARK 5, N.J.
MARKET 2-4318

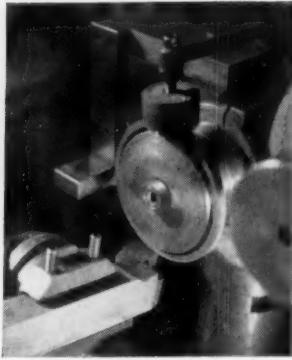
On any carbide grinding job...

Nothing



Norton Vitrified Bonded Diamond Wheels

outperform all others of this type. They combine the fast cutting action of resinoid bonded wheels with resistance to grooving approaching that of metal bonded wheels. Great durability is another advantage.

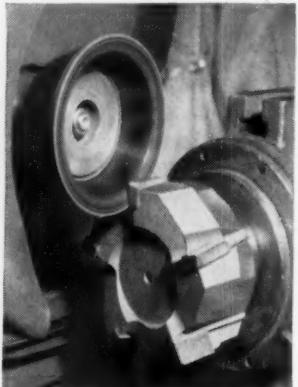


Production Grinding of Single Point Carbide Tools is most economical and efficient with Norton vitrified bonded diamond wheels. Grinding chip breakers, as illustrated, is another important job for which they are ideal.



Norton Resinoid Bonded Diamond Wheels

combine fast cutting with long, money-saving wheel life that makes them favorites for precision sharpening. Made in two bond types — regular, for wet grinding and B6, for dry grinding. It is always more economical to use each bond type on the applications for which it is best suited.



On Your Multi-Tooth Grinding Jobs, Norton resinoid bonded wheels hold size so that each tooth gets uniform grinding. The straight, thin shapes make excellent cut-off wheels for salvaging damaged carbide tools.

Norton wheel cuts like a diamond

Diamond wheels in carbide grinding more than pay for themselves. "It's just like finding money."

You can cut grinding time — and grinding costs — to the lowest possible by standardizing on Norton diamond wheels.

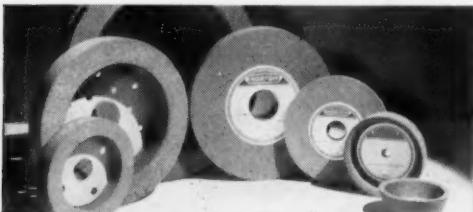
As a result of Norton Company's long pioneering† in diamond wheel development, Norton diamond wheels bring you a combination of long service life and efficient cutting action that means maximum economy — across the entire range of carbide grinding applications.

Besides the vitrified and resinoid bonded types shown here, Norton diamond wheels are also available in a metal bond — where durability and resistance to grooving, rather than a fast rate of

cut, are primary considerations. For every application the proper size and type of Norton wheels are available in a wide variety of grit sizes. (For small-volume requirements, Norton K Bond CRYSTOLON wheels are often the best investment. See small illustration.)

See Your Norton Distributor

for aid in selecting the right Norton wheels for every grinding job. And ask him for the 142-page, illustrated booklet: "Grinding Carbide Tools." Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. Listed under "Grinding Wheels" in your classified phone directory. Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.



Norton K Bond CRYSTOLON* Wheels

feature fast, cool cutting and exceptionally uniform performance. The vitrified K Bond permits half-grade increments of hardness, enabling you to "pin-point" your specifications.



For Small-Volume Carbide Grinding, especially in single-point applications, the K Bond wheels offer outstanding economy. Their high stock removal rate and uniform performance assure quality grinding at lowest cost.

W-1580

NORTON

*Making better products...
to make other products better*

and Its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

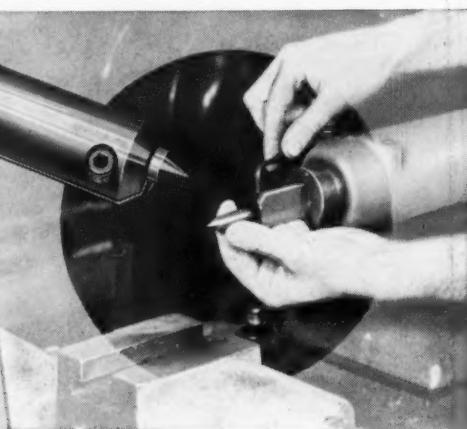
*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

†First with resinoid bonded, first with metal bonded, first with vitrified bonded diamond wheels.

NEW *Grip-Tip* CENTERS

CHECK THESE *Grip-Tip* FEATURES

- Long-Life Holders
- Replaceable Carbide Tips
- Easy Insertion and Removal of Male or Female Tips
- Reduced Machine Down-Time
- Lower Cost for Replacement of Carbide Tips
- Carbide Tips Accurate to .0005"
- No Regrinding of Holder
- Carbide Tips Are Easy and Inexpensive to Stock
- Reduced Regrinding Time
- Longer Diamond Wheel Life



with

REPLACEABLE CARBIDE TIPS

Grip-Tip Centers are specifically designed to substantially reduce your replacement costs and machine down-time for regrinding or replacement of worn or chipped centers.

Male or female carbide tips are inserted or removed from the tool steel holders by simply turning a screw. The unique clamping action of holders on tips is positive and quick . . . you save replacement time with Grip-Tip Centers.

The life of Grip-Tip holders is practically unlimited, for, only the dull or chipped carbide tips are

reground. Because the steel holder is not ground when sharpening the carbide tip there is less clogging and longer life for your diamond wheels. Also, the relatively inexpensive double end tips in both male and female types can be stocked with a minimum investment . . . Grip-Tip Centers reduce tool and inventory costs.

Grip-Tip Centers increase your production by permitting full utilization of machine tools. It takes but a minute to remove old carbide tip and replace with a new one . . . machine down-time is less with Grip-Tip Centers.

For Further Information, Write to:

DETROIT REAMER & TOOL CO.

2830 EAST SEVEN MILE ROAD • DETROIT 34, MICHIGAN



MODERN Machine Shop

ADVERTISING REPRESENTATIVES

Granville M. Fillmore, Vice President
342 Madison Ave., New York 17, N. Y.
Murray Hill 7-7390

Eastern New York State, Connecticut,
Massachusetts, Rhode Island, Vermont,
New Hampshire, Maine

Duncan W. Barton
342 Madison Ave., New York 17, N. Y.
Murray Hill 7-7390

Eastern Pennsylvania, Central New York
State, New Jersey, Maryland, Delaware,
Washington, D.C., Long Island, Brooklyn

George E. Hay
431 Main Street, Cincinnati 2, Ohio
MAin 0182

Western Pennsylvania, Western New York
State, Ohio, Kentucky, Southern Indiana

John M. Krings, Vice President
Tribune Tower, Chicago 11, Illinois
DElaware 7-5441

Western Michigan, Illinois, Wisconsin,
Iowa, Minnesota, North Dakota, South
Dakota, Northern Indiana

Norman S. Rogers
431 Main Street, Cincinnati 2, Ohio
MAin 0182
Central Indiana

**Gene J. Schwarber, Advertising
Manager**
431 Main Street, Cincinnati 2, Ohio
MAin 0182
Eastern Michigan,
Missouri, Kansas

The Robert W. Walker Company
2330 West Third St., Los Angeles 5, Calif.
DUnkirk 7-4388
57 Post Street, San Francisco 4, Calif.
SUtter 1-5568
California, Oregon, Washington

MODERN MACHINE SHOP
431 MAIN ST. CINCINNATI 2, OHIO

Pricing Quality Reamers by Size and Type

is easy as **A B C**
with the exclusive new

COMPARATIVE NET PRICE SELECTOR



Now for the first time you can **A** pick
the size reamer you want from
L&I's long list of standards, **B** select
the type best suited for your job,
and **C** find the **NET** price quickly
and easily. And every reamer is
available **FROM STOCK**.

L&I's complete line of Quality
Reamers makes it your No. 1 source
for all reamer needs.



Write
for this book
for Buyers
and Users.

LAVALLEE & IDE, INC. CHICOPEE, MASS.

Please send me your new Comparative Net
Price Selector.

Name _____

Address _____

City _____ Zone _____

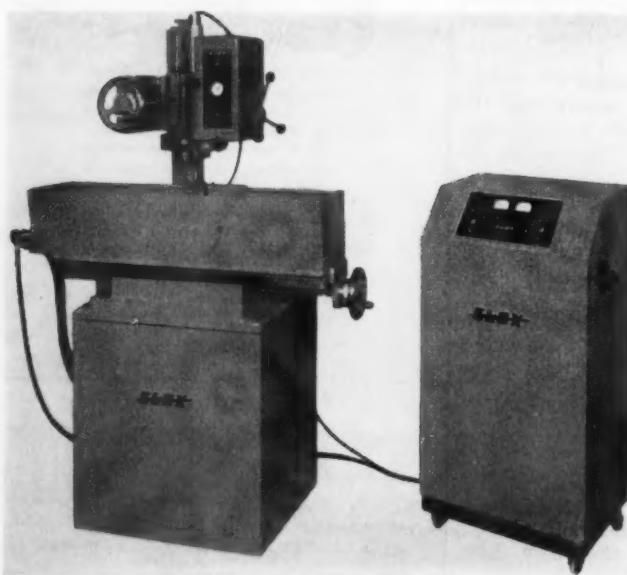
State _____

On Exhibit at

A small tilting-type vacuum melting furnace, actually in operation, will be exhibited in Booth No. 2167 by F. J. Stokes Machine Co., Philadelphia, Pa. The furnace will be of 30-lb. capacity and will be melting and casting, completely under vacuum, small flat rods of a standard low-alloy steel. The unit, roughly 3 ft. square, will thus be a miniature alloy steel-making plant, operating on a pilot-plant scale. Signs at the exhibit will indicate when the next "pouring" will occur, and spectators will be able to watch the casting take place within the vacuum chamber through sight glasses. Later, samples of the output of the vacuum furnace will be placed in front of the visitors for inspection. Also featured in the exhibit will be a large selection of powder metal parts made on Stokes automatic presses, and a variety of products vacuum-plated in Stokes vacuum-metallizing equipment.

To meet industry needs for a machine tool that will compliment the inherent precision of electrical discharge machining, Elox Corporation of Michigan, Clawson, Mich., and The Cincinnati Milling Machine Co., Cincinnati, Ohio, have designed a new precision electrical discharge machine tool, identified as the M-500, which will be shown in Booth No. 1612. The machine has been designed with accuracy, ruggedness and flexibility of adjustment in mind. The machine features a dual coolant supply, consisting of a high pressure pump and a separate high capacity pump for quick filling of the oil reservoir; heavy cast frame construction with micrometer adjustment on longitudinal feed, head cross feed and head vertical feed; and a 9 x 15-in. movable insulated bolster plate. The specific design of the work pan mounting provides use of the entire table area which is 10 x 42 inches. The machine has been constructed to accommodate a great range in sizes of workpieces without loss of accuracy in the tool. Of particular interest is the 9½-in. travel of the lapped-in quill. The table and head move on

locking V-ways. The machine tool is mounted on a heavy base constructed of 8-gauge steel plate to prevent warping of the mounting table. The machine is designed for floor mounting with levelers. The oil reservoir and pumps are mounted entirely within the base and slides have been provided for easy removal for cleaning and maintenance. All operating levers are external and within easy reach of the operator. The automatic feed can be disconnected by a simple push-pull operation, allowing for quick handwheel adjustment of electrode.



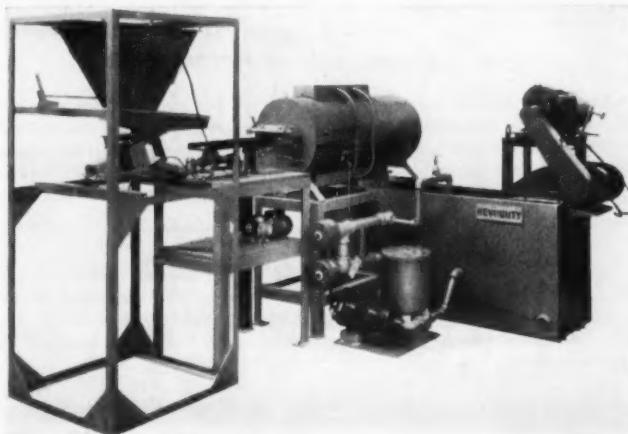
the Metal Show

A newly formulated drawing compound which is water miscible in ratios ranging from equal parts to 1 to 15 parts and which embodies a unique dispersant additive ensuring against caking on dies and knock-out or stripper mechanisms, will be introduced in Booth No. 1529 by The Texas Co., New York, N. Y. The compound, a mixture of mineral oil, emulsifying agents, non-abrasive pigment and a dispersion additive, was developed to handle work being processed under difficult forming conditions where an economic, miscible material is desirable. It can easily be removed by water washing. The dispersion agent, it is claimed, effectively retards the settling out of the compound's carefully selected pigment. Because of its unusual miscibility, the compound can be cut back to fit a wide range of operating conditions. It is easy to apply to the work, and it does not have an objectionable odor.

In Booth No. 247, Hevi Duty Electric Co., Milwaukee, Wis., will feature a shaker hearth furnace (illustrated) equipped with an automatic parts feeder for feeding parts into the furnace for heat treating, a quench tank conveyor for removing the treated parts and a Quench-O-Trol unit for maintaining exact temperature of the quenching oil. The furnace can be used for hardening, carburizing, dry cyaniding and similar heat treating operations requiring temperatures up to 1,900 deg. F.

The furnace can also be furnished in higher temperature ranges, if desired. The furnace is available in standard sizes with capacities up to 175 lb. of parts per hour. The parts are fed from a hopper onto the oscillating hearth plate which moves them through the heating zone and discharges the parts directly into the oil quench. The quench tank is provided with two perforated baskets for hand removal, or a conveyor may be installed for automatic removal of quenched parts. An oil cooling or heating and recirculating system may be installed as an accessory item. Mar-quenching using heated salt or oil in an insulated quench tank may also be performed. By excluding the air and using a reducing atmosphere in the gas-tight muffle, the surface of the parts may actually be brighter after hardening than before entering the furnace. Automatic operation, uniform temperatures and quench control are said to provide for identical heat treatment of each piece. Complete control of the various heat treating processes is said to be easily obtained. In dry cyaniding and carburizing operations, uniform case depths of 0.002 in., it is claimed, can be obtained.

Also displayed will be a pit draw furnace which has been redesigned to offer many advantages and modern features. This furnace is said to be very economical to operate and maintain and is especially suitable for smaller machine shops and where production is not of large enough volume to warrant the purchase of a continuous draw furnace.



ON EXHIBIT AT THE METAL SHOW



tal or inclined; precision optical tooling level to sweep horizontal planes to $\frac{1}{4}$ -second accuracy, with built-in optical micrometer reading directly to 0.001 in. and providing fully erect, normal image; Micro-Maag Internal Micrometers (center illustration) for checking the dimensional accuracy of bores; Surface Micro-Interferometer (right illustration), an ultra-precise measuring instrument which enables measurement in terms of wave lengths of light; Talymin III, a new electronic gage head operating with the well-known Talsurf Amplifier and Recorder; Talyrand Measuring Instrument for measuring the roundness of parts, such as balls, rollers, pistons, cylinders, bearing races, and so on; Taylor-Hobson Sweep Optical Square, an instrument incorporating the well-known micro-alignment telescope and designed to determine lack of true flatness of a plane surface without reference to leveling; and optical tooling accessories, including new displacement targets, improved auto-reflection mirrors and targets.

Other products to be displayed include scales and projection units for machine tools; Auto Collimators to fit all engineering applications; micro-alignment telescope and a complete range of optical tooling accessories; through-sighting cylindrical optical square to establish whether points lie in a true perpendicular plane; clinometers for checking angles and inclinations; precision levels, sight levels and Theodolites; Talsurf, an electronic instrument to determine accurately to either an average value or on a permanent chart the roughness of surfaces under magnifications; cylindrical squares; Matrix Drill Point Checker, a portable gage to check angle and centrality of drill points on twist drills from $\frac{1}{4}$ to $2\frac{1}{2}$ in. in diameter; Hyprez Diamond Compounds, including the applicator gun, compound cartridges, bench rack and other Hyprez accessories; and the Di-Profiler Reciprocating Hand Machine for finishing straight or curved surfaces, small holes, dies, molds, regular or irregular drawing dies, and similar operations.

The entire line of precision equipment for the tool and machine industries, manufactured by The Challenge Machinery Co., Grand Haven, Mich., will be shown in Booth No. 2130. Included in the array of precision equipment will be semi-steel surface plates and tables for layout, inspection, and assembly lines; box angles and parallels; V-blocks; and cast-iron top work benches.

Metal & Thermit Corp., New York, N. Y., will feature recently developed Murex Contact Arc Welding Electrodes in Booth No. 409. Working demonstrations of the high speed electrodes will be presented continuously during show hours, using both a.c. and d.c. welding machines. The electrodes have heavy coatings containing a high percentage of iron powder. During welding operations, the iron powder enters the weld, supplementing the metal derived from the core wire, and is said to provide rapid rates of deposit. In addition, it is claimed that the powdered iron contributes to smooth arc action, eliminates undercutting and assures high crack resistance.

AMAZING
SAVINGS
IN
METAL CUTTING
ARE MADE BY

**FRICITION
SAWING**

with
Tannevit3 HIGH
SPEED **BAND SAWS**

The ease and speed with which these machines cut through sheets of soft or hard steel, non-ferrous metals, plastics and many other materials provides marvelous opportunity for increasing production and lowering costs. And for cutting formed parts, or trimming castings, there's nothing to compare with it, for the down-drag of the saw is so negligible that in most cases no jig or rest whatsoever is required. Get the complete facts, NOW!

GET YOUR FREE COPY OF FRICITION SAWING

The TANNEWITZ WORKS
GRAND RAPIDS, MICHIGAN

ON EXHIBIT AT THE METAL SHOW



and Pyromark[®], high temperature paints. The focal point of the exhibit will be a live demonstration of these products. Trained technicians will be on hand to illustrate the functions of Tempilstiks[®] and to discuss temperature determination problems encountered in research and production.

Visitors to the booth will be invited to register to receive a newly revised edition of the firm's Basic Guide to Ferrous Metallurgy, a plastic laminated, 16½ x 21 in. wall chart in color. Visitors will also be offered sample Tempil[®] Pellets for trial under their working conditions. Instruction leaflets and technical reprints covering a large number of specialized applications for Tempil[®] products in the metal fields will also be available.

In Booth No. 1540, Carboloy Department of General Electric Co., Detroit, Mich., will exhibit cemented carbide tools and blanks, including standard and special blanks in various grades, rectangular blanks with and without radii, rectangular strips, formed blanks, simple cylindrical blanks, circular form or fluted blanks, blanks with drilled holes or plugs, simple nibs and bushings, special shape nibs and bushings with broached holes, cylindrical and triangular blanks, extruded rod in standard and special sections, standard and special tools, grooving tools, tipped boring tools, solid boring tools, tools with shanks held to special tolerances and roller turner tools.

Dies, cases and nibs, including draw dies, nosing and cupping dies, extrusion punches, blanking dies, swaging dies, mandrels, solid bushings, compacting die sets, mold liners and finished mandrel nibs will also be shown, as well as clamp-on blanks, pulley grooving blanks, reamer blanks, square, round and triangular inserts, lathe and grinder center blanks, solid balls, check valve seats, discs, ring gage bushings, plug gage bushings, solid and slotted guide rings, saw tip blanks and stone chisel blanks, wear parts, mining tools, masonry drills and diamond dressers.

Thermistors, including a variety of discs, washers, rods and special high-temperature rods will be displayed, along with two grades of Hevimet; namely, Grade I which has high tensile strength for rotating inertia applications and Grade II for radiation shielding. Permanent magnets, sintered and cast, including Celastic-coated assemblies, horn-type assemblies and mechanical assemblies in Alnico grades 1 through 6, will be shown, as well as high temperature vacuum-melted specialty alloys.

Carboloy cemented carbides include grades for cutting steel and grades for cutting all other materials. The steel cutting grades include Grade 350 for light roughing and general steel finishing; Grade 370 for heavy-duty steel cutting; Grade 831 for precision finishing; Grade 78 for finishing and light roughing; Grade 78B for general purpose machining; and Grade 78C for heavy-duty and interrupted cutting. Grades for cutting all other materials include Grade 999 for precision finishing; Grade 905 for finishing and light roughing; Grade 883 for general machining to close limits; Grade 44A for general purpose machining; and Grade 55A for heavy-duty interrupted cutting.

A wide variety of chrome carbide grades offering corrosion and oxidation resistance will also be exhibited.

In Booth No. 1523, Tempil[®] Corp., New York, N. Y., will exhibit its line of temperature-indicating materials, including Tempilstiks[®], temperature indicating crayons; Tempilac[®], temperature indicating liquid; Tempil[®] Pellets, temperature indicating pellets; Tempi-Alarm[®], temperature sensitive paints; Thermindex, temperature indicating paints;

A Mechanical Eye to Watch Your Tools



U.S. Pat. No. 2,679,038
Other Patents Pending

Reduce Tool Costs!

Cross Tool Control Unit
Automatically Stops
Machine When Tools
Need Changing



The Cross Tool Control Unit reduces tool costs, decreases machine downtime. Available in four different sizes, it can be used with most types of metalworking equipment.

Here's what it does:

- ★ Provides continuous picture of used and unused tool life and establishes performance standards.
- ★ Decreases downtime by permitting tool changing in groups.
- ★ Reduces scrap by stopping machine before tools lose size.
- ★ Reduces tool grinding costs.

Write for complete details today.

Established 1898

THE **CROSS** CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

ON EXHIBIT AT THE METAL SHOW



operations. The portable degreaser requires only five to seven gallons of cleaning solvent for effective operations. Reclaiming the dirty solvent for re-use is one of the economy features of the unit. The reclaiming process is accomplished automatically by a condenser which also controls the vapor height. Clean, pure vapors are generated by electric elements or gas burners mounted in the base of the assembly, and a thermostatic control is said to ensure operational safety and provide maximum economy. The barrel is a standard, 50 gallon, galvanized unit, with a large, unobstructed work area 23 in. in diameter and a vapor depth of 18 inches. Electrically heated models are equipped with 3.8 kw. electric heating unit, condensing chamber, thermostat, heavy-duty bronze sump pump, motor, hose and lance, 15-ft. plug-in cord and unit cover. Gas fired models are also available.

In Booth No. 2160, The Motch & Merryweather Machinery Co., Cleveland, Ohio, will exhibit the following products: "Kroslok" Face Milling Cutters and Shell End Mills, 3 through 32 in. in diameter; "Triple-Chip" Segmental Saw Blades, the largest being an 84-in. diameter blade, for cutting off metal; "Triple-Chip" Solid Saw Blades for metal cutting; "Triple-Chip" Slitting and Slotting Saw Blades, 3 through 8 in. in diameter; "Master-Cut" Slitting and Slotting Saw Blades, 3 through 8 in. in diameter; and dual drive adaptors, used in slitting and slotting operations for maximum protection to the blades. In addition, "Triple C" Grinding Coolant will be formally introduced to the metalworking industry at the exhibit.

In Booth No. 1353, Platecoil Division of Tranter Mfg., Inc., Lansing, Mich., will exhibit Platecoil, a heat transfer unit, which consists of two embossed sheets of steel and special alloys, seam and spot welded together to provide channels for passage of heating or cooling media. The unit is used in many industrial heating and cooling processes. The heat transfer unit has broad applications, being used in electroplating, bonderizing, industrial spray washers, degreasers, acid pickling, paint drying, anodizing, cooling quench oil and many other metalworking processes. The unit is starting to be made available in special, corrosion-resistant metals for corrosive processes.



With a Dake Press, lift truck tires can be changed right in your plant

No need to carry an inventory of spare lift truck wheels in different diameters and widths! With a Dake Hydraulic Press you need only tires and rims which can be pressed on and off in your own plant.

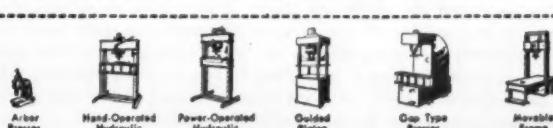
This not only means lower investment and reduced service time, but it brings additional savings from being able to buy tires direct from a mill supplier.

The Dake customer pic-

tured above says his Dake Press pays its way on tire service alone . . . and he uses it in addition for many plant maintenance operations — such as pressing in bushings, pressing off frozen sprockets and gears, and straightening plate steel for briquetting presses.

Have you stopped to think what a Dake Hydraulic Press could do for YOU? Send for illustrated Catalog 129.

Dake Engine Company, 612 Seventh St., Grand Haven, Mich.



ON EXHIBIT AT THE METAL SHOW



available in three sizes to accommodate parts up to 36 in. in the maximum dimension. The heated part is held between two dies while the quenching takes place. Ring parts are held round and concentric by the expansion of an assembly of segments within the bore or by contraction on the outside diameter. Relative pressures exerted on the various portions of the work are accurately controlled. Flow of the quenching oil to any part of the work also can be held to close limits.

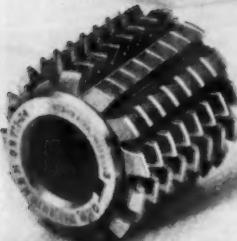
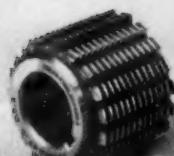
Also displayed will be a rolling quench machine, for quenching shafts or similar parts, which operates by rolling the part under pressure during the quenching cycle so that hardening is achieved with a minimum of distortion. Roller pressures are preset by the operator and are automatically controlled. The direction of flow of the quenching fluid, and the volume, up to 350 g.p.m., also can be adjusted for each job. The rolling quench machine will handle shafts or other similar parts from 9/16 to 4 in. in diameter, and from 6 to 43 in. in length. Parts with integral gears, cams or shoulders up to 8 in. in diameter can also be accommodated in the machine.

The Gleason No. 1 Gear Surface Hardener featuring a sensitive electronic control will also be shown. On this machine, oxy-acetylene flames traverse each individual tooth separately. A sensitive radiation pyrometer is focused directly on the tooth being heated and receives radiant energy from the hot metal. An electronic balancing mechanism translates that energy into forces which control the travel of the burners along the tooth. Operation of the machine is entirely automatic, after the optimum hardening temperature is preset by the operator and the machine is started.

A wide variety of steels, both forgings and castings, can be surface hardened on the machine. Since the oxy-acetylene flame is used only as a heating medium, there is no change in chemical composition of the material. As only the gear teeth are heated and each tooth is heated uniformly and progressively on both sides, there is said to be no measurable distortion, and the region of hardness is limited to the wearing surfaces. The No. 1 machine accommodates bevel gears up to 24 in. pitch diameter, spur and helical gears up to 30 in. pitch diameter and internal gears up to 24 in. outside diameter.

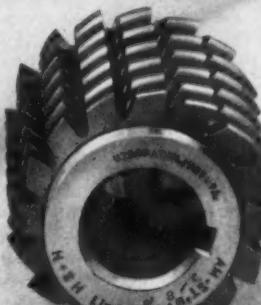
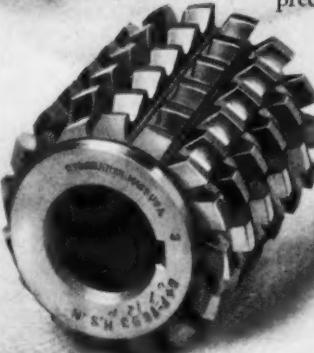
A quenching press (illustrated) which is designed for the accurately controlled quenching of round, flat, shafted or irregular parts will be exhibited in Booth No. 454 by the Gleason Works, Rochester, N. Y. The machine holds and aligns heated parts during the quenching process so that they may be hardened with a minimum of distortion. Operation of the quenching cycle is completely automatic, and is accurately preset by the operator. In the press, the quenching oil is forced uniformly over and around the heated part. The rate of flow can be accurately controlled at all stages of the quenching cycle. Thus, it is possible to obtain a rapid initial quench, until the critical point of hardening temperature is passed, then a slow quench to allow the temperatures throughout the section to equalize and to cool the material without internal stresses and, finally, a rapid cooling quench to bring the temperature of the part down to the point where the operator can handle it. The quenching press has a built-in pumping system and oil reservoir and can be arranged to use water, caustic soda, or other quenching medium, if desired. The press is

UNION



Precision was built into every detail of this Nineteenth Century clock.

Today, the finest gears are mechanically reproduced by means of precision-built hobs. For the best in hobs — demand precision hobs by Union.



Renaissance 19th Century French Clock,
made in Paris by RAINGO, Circa 1840

N

HOBs:

Involute Spline

Parallel Spline

Worm Gear

Tangential

Spur Gear

Helical Gear

Ground

Unground

Accurate Unground

Finishing

Roughing

Preshave

Protuberance

Stub-Tooth

Standard Gear

Composite Form

Combination Pitch

Topping

Semi-Topping

Non-Topping

Herringbone Gear

Shank Type

Shell Type

Serration

Square Shaft

Tapered Hole

Multiple Thread

Special Shape

SPROCKET

Silent Chain

Roller Chain

Special

UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS

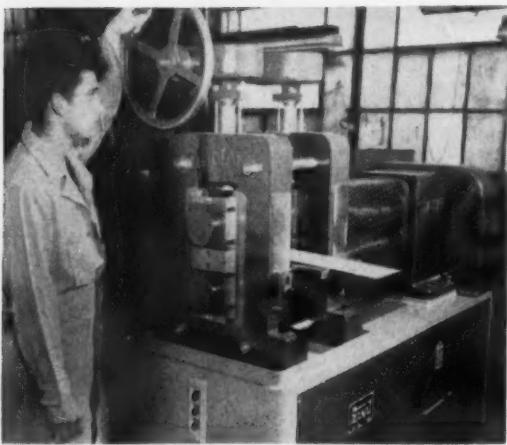
Milling Cutters Gear Cutters Twist Drills Hobs Reamers Carbide Tools

OWNERS AND OPERATORS OF: S. W. CARD MANUFACTURING CO. DIVISION, Mansfield, Mass.

BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec

CUT INVENTORY COSTS, ORDER FROM YOUR LOCAL DISTRIBUTOR

ON EXHIBIT AT THE METAL SHOW



sertion of the two smaller work rolls between the larger back-up rolls which become the work rolls of the two-high setup. The mill is particularly advantageous for organizations desiring one machine to do the job of several.

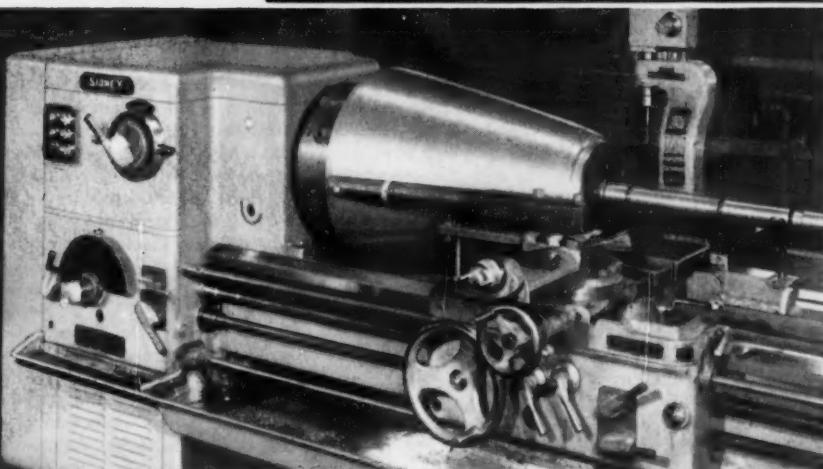
Included among the other metal processing machines to be demonstrated are a tandem wire flattening mill which is especially suitable for the manufacture of such precision products as slide fasteners, hair springs, electronic tube components, resistance elements, and suspension ribbons; a "package" rolling mill which comprises a standard 4 x 6 two-high strip mill, a 4 x 6 two-high rod mill and a 16-inch diameter bull block for drawing a wire; slitters, for close tolerance slitting operations, which are available in many sizes from 2½ in. arbor and up, with coil weights and sizes to suit; and roller levelers, for sheet and strip, that can be incorporated into production lines or operated individually. Other Stanat equipment to be shown includes mills for flat rolling, mills for producing wire and other shapes and torque arm mills to deliver power needed for heavy reductions of tough materials.

In Booth No. 1411, Adamas Carbide Corp., Kenilworth, N. J., will display premium carbide grades for applications where extremely difficult machining operations are involved. These grades include Grade 434 which contains four carbides, providing high shock resistance and good wear resistance for very heavy cuts, both continuous and interrupted; Grade 548 which also combines four carbides, making it ideal for shell finishing; Grade GG, a high tantalum grade, suitable for hot working and removal of hot welding flash; and Grade 474, a modification of Grade GG but not as strong. Two extremely tough impact and wear resistant rock bit grades, Grade 502 and Grade 569, will also be shown. Grade 502 was developed specifically for impact applications, while Grade 569 was developed specifically for mining and rock drilling applications where wear resistance is more important than shock resistance. A preformed blade, for helical milling cutters, with a helix formed in the face and a helical clearance formed on the top of the blade will be exhibited. The back and bottom of the blade are flat so that the blade can be brazed into a straight axial gash pocket. Drill tips for twist drills that were designed especially for drilling cast iron and non-ferrous metals and preformed hob blanks with necessary clearance and lead angles will also be displayed, as well as the "Carb-A-Guide" and representative samples of tungsten carbide tools, tool tips, dies, wear parts and special shapes. Information on carbide grade, applications and late developments in the carbide field will be available; and experienced sales and service engineers will be on hand to assist carbide users with their carbide problems.

A unique two-high/four-high combination mill (illustrated), along with a complete line of laboratory and production rolling mills, slitters and levelers for small and medium production requirements, will be shown publicly for the first time in Booth No. 1659 by Stanat Mfg. Co., Long Island City, N. Y. The new, heavy-duty two-high/four-high mill can be used for bar, rod and strip reduction and is capable of performing hot flat rolling, cold flat breakdown, cold flat finishing on either a two-high or a four-high setup and hot or cold rolling of wire and shapes. The highlight of the mill's versatility is the rapid changeover between two-high and four-high configuration accomplished simply by the removal or in-

SIDNEY FLUID TRACER LATHES TAKE THOSE EXTRA BIG JOBS IN THEIR STRIDE

THE MEDART COMPANY
OF ST. LOUIS, MO., IS SHOWN
CONTOUR TURNING THE NOSE OF
A GUIDED MISSILE



It's a big piece of work but an easy job for a SIDNEY FLUID TRACER LATHE. Rigidity is not impaired despite the extremely long over-hang of the tool because of Sidney's extra heavy cross slide support. In fact, the entire lathe is designed for permanent accuracy under the heaviest service.

For any job — large or small — SIDNEY FLUID TRACER LATHES follow every detail with faithful accuracy from template or master piece . . . swiftly . . . as many times as desired.

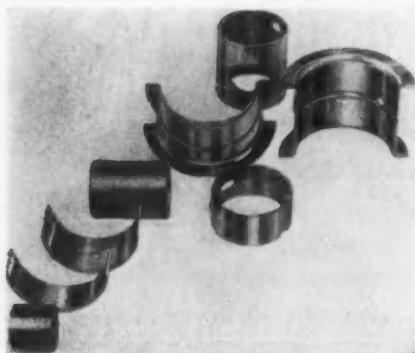
YOU GET MORE WORK PER HOUR AT LOWER COST PER HOUR

Write for bulletins or to have representative talk things over.

THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904

ON EXHIBIT AT THE METAL SHOW



In Booth No. 1909, a new white alloy, copper-manganese-tin, will be shown in sample form by The Malayan Tin Bureau, Washington, D. C. Also displayed will be new bearing alloys and solders and fine examples of modern pewter (containing 93 per cent tin). The display will feature the importance of Malaya as a tin producer and the versatility and new uses of Straits tin in American industry. The copper-manganese-tin, containing 15 per cent manganese and 6 per cent tin, is a recent development of the Tin Research Institute laboratory in England. The Malayan Tin Bureau will show a spoon and a fork made from the alloy. The white, ternary alloy has good mechanical properties, can be readily cast, forged, rolled, stamped and otherwise

processed. It is corrosion resistant and can be plated.

Tin-nickel coatings of 65 per cent tin and 35 per cent nickel will be shown in tableware pieces, including a scalloped-edged tray and a spoon, and in an automotive part. This alloy is considered promising as a plating material for automobile trim, domestic appliances, electrical equipment and shop fittings. Tin-zinc coatings, principally in combinations of 78 per cent tin and 22 per cent zinc, will be displayed on radio components and washers. This alloy, which has a satin-white matte appearance, provides excellent corrosion protection, is easily solderable (even without flux) and costs about half as much as cadmium. It is being used increasingly by manufacturers as a standard coating on radio and television chassis. Bearings (illustrated) made solidly of aluminum tin and of thin sections of alloy backed by steel and Duralumin will also be shown. The alloy is said to be superior to babbitt in fatigue strength at working temperatures and has excellent anti-friction properties. Tin content varies from about 20 to 30 per cent. Addition of about 3 per cent copper gives the alloy 3 1/2 times the strength of babbitt at 150 deg. C. Solders of antimonial tin that are much stronger at high temperatures than tin-lead and are also resistant to cracking will be displayed.

Tin-Indium. Coils of tin-indium solder will also be on exhibit. This is a low melting solder capable of wetting non-metallic surfaces, such as glass and ceramic. Glass-to-glass and glass-to-metal vacuum tight seals can be made with shear strength as high as 1,000 p.s.i. Modern pewter, which is 93 per cent tin and contains no dulling lead, will be shown in table articles produced in Malaya, England and the United States. Included will be a tea and coffee set, pitchers, porringer and trays. The American pieces are Colonial reproductions. A new use for modern pewter is as an inlay in table tops and as leg tips. There will be an extensive collection of collapsible tubes made from tin containing 1/4 of 1 per cent of copper which provides the optimum degree of strength and collapsibility. This alloy is non-toxic.

HIGH SPEED or CARBIDE

FACING TOOLS

FOR HOLES FROM
1/16" UPWARD
17 DIFFERENT SIZES

Write For Complete Data

COMET Tool Co.

**For
MASS
PRODUCTION**

- CONSTANT CLEARANCE
- CONSTANT SHAPE OF CROSS SECTION
- EASY RESHARPENING
- CONVENIENT TO USE
- LONG LIFE

738-MM BROADWAY

• NEW YORK 3, N. Y.

Dealers! Here's
a Profit-Maker!



For Precision
Between Centers

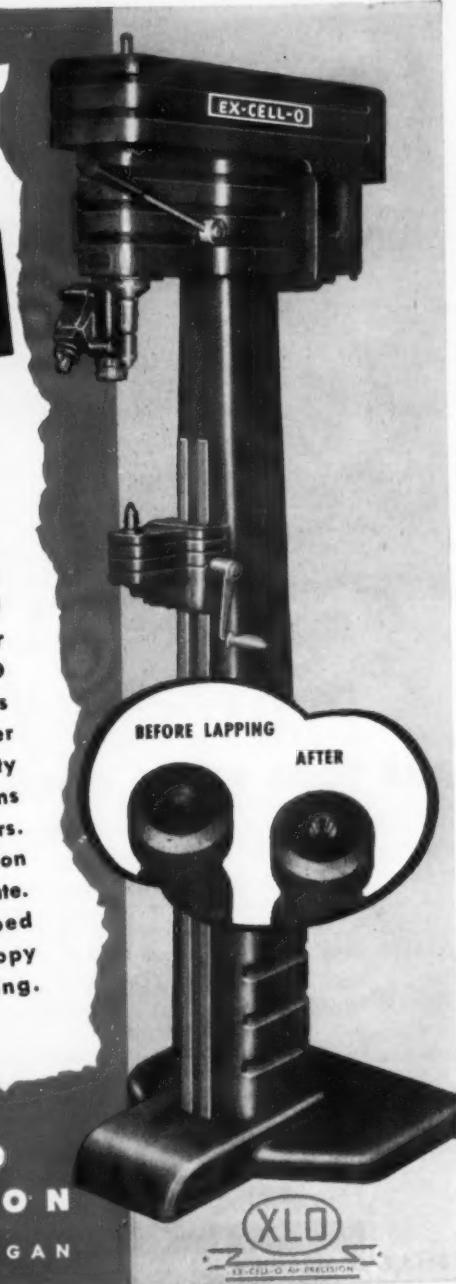
EX-CELL-O

CENTER LAPPING MACHINES

Meeting today's precision standards requires careful checking of every phase of the job, including the center holes in the work. Ex-Cell-O Center Lapping Machines correct inaccuracies of center holes that affect the quality of all subsequent operations performed between centers. These machines are precision built and are easy to operate. They are fully described in Bulletin 40271—a copy is yours for the asking.

EX-CELL-O
CORPORATION

DETROIT 32, MICHIGAN



ON EXHIBIT AT THE METAL SHOW

In Booth No. 342, Handy & Harman, New York, N. Y., will have an operating exhibit featuring Easy-Flo and Sil-Fos silver alloy brazing. Other silver products having growing industrial uses will also be shown.

Two main features will form the action part of the Handy & Harman display. One feature will be a production job where the brazing alloy will be preplaced and the parts to be joined will be heated automatically as they pass through a heating zone. At another station, torch heating will be used to demonstrate the versatility of silver alloy brazing. Case histories from various parts of the country will also be displayed. The booth background will point out the various features which make silver alloy brazing so economical to use. Engineers in attendance will gladly answer any questions you may have about the use of Easy-Flo or Sil-Fos brazing alloys on your products.

SPECIAL TAPS



ARE TOPS FOR A GOOD REASON

Every detail of every special tap produced is recorded under a unique Detroit Tap system.

This record system controls quality from your first order. Having found the "right" tap for the job, you'll get the same results with every additional tap you order.

Such records minimize development of special taps. Often, the new problem is so similar to a previous one—already a matter of record—that a minimum of research and engineering is required. The advantage of such service is obvious. See your Detroit Tap representative today.

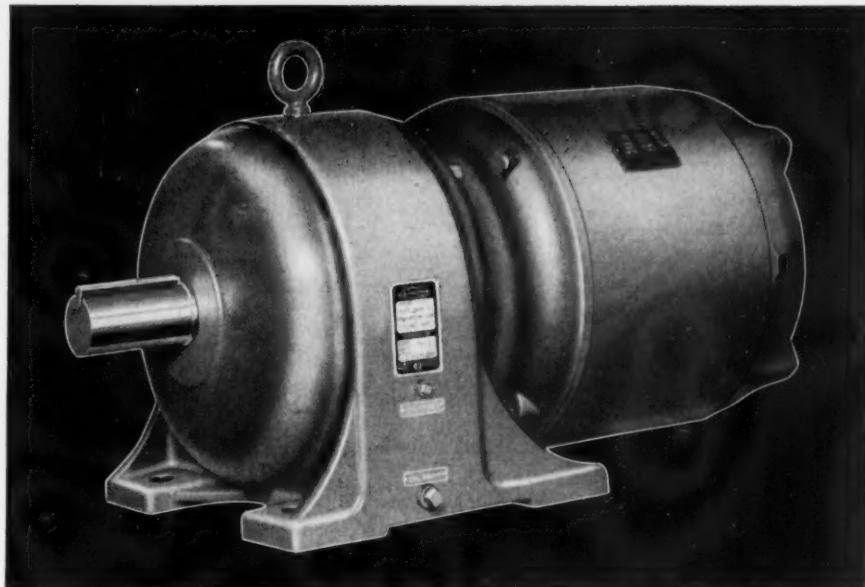
DETROIT

T A P & T O O L C O.

8615 E. EIGHT MILE RD.

BASELINE, MICHIGAN

The new "Auto-carb" Automatic Continuous Carbon Controller will be featured in Booth No. 714 by Surface Combustion Corp., Toledo, Ohio. The instrument, used in conjunction with the "Surface" Dew Point Recorder, provides for continuous control of the carbon potential of the furnace atmospheres. It is used for control of furnace atmosphere in gas carburizing, clean hardening and other heat treating processes. Surface Combustion's exhibit will also present special and standard heat treat equipment for all heat treating processes, including steel mill operations. Industrial gas burner equipment and Janitrol unit heaters for industrial plant heating will also be included in the display. The exhibit will be manned by sales and engineering personnel from the company's general offices, as well as field sales engineers.



The power you need at the speed you need it . . .

HOWELL GEAR MOTORS

New dependability, greater starting torque and top efficiency, with output speeds as low as 7.5 rpm. are now available in Howell Gear Motors.

This compact, single-unit motor may well be the answer to your gear reduction problems. Combining the finest heavy duty gearing with top quality industrial motors, Howell Gear Motors reduce drive failures and downtime.

Howell Gear Motors use duty-rated, lifetime gearing, with file-hard tooth surfaces and tough, resilient cores. They are available in all types of enclosures, from 7.5 to 780 rpm. with a capacity range from 1 to 150 hp., in all three AGMA service classifications.

For full information on Howell Gear Motors, contact the Howell man in your area, or write the factory direct for Bulletin GM-1.

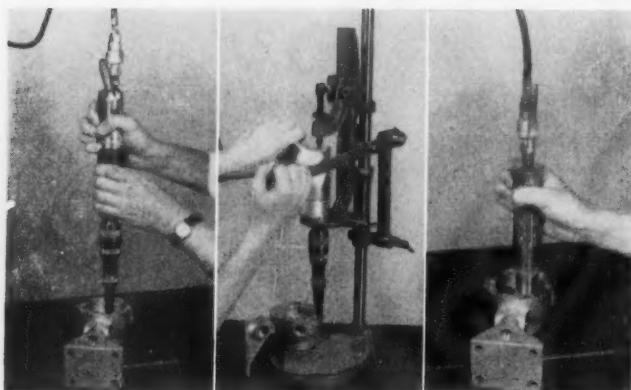


HOWELL MOTORS

HOWELL ELECTRIC MOTORS COMPANY, HOWELL, MICHIGAN

PRECISION-BUILT MOTORS FOR INDUSTRY SINCE 1915

ON EXHIBIT AT THE METAL SHOW



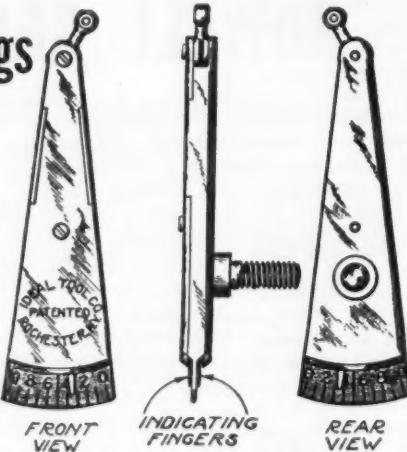
Power inserting tools (illustrated) for production line installation of wire screw thread inserts will be demonstrated in Booth No. 1655 by Heli-Coil Corp., Danbury, Conn. Powered by air and electricity, the new powered inserting tools are designed primarily for use in plants installing large numbers of screw thread inserts. The inserts provide strong threads in light, soft materials

such as aluminum, magnesium, plastics and wood, and are used for repairing damaged and stripped threads; for corrosion resistance; for resistance to heat; and for wear resistance in parts that must be disassembled frequently. A power tang break-off tool will also be demonstrated as a companion piece to the inserting tool for large users of inserts. A handy kit containing a total of 125 inserts in four commonly used sizes, plus taps, manual inserting tools and an extractor, will be displayed. The kit is designed for the rapid repair of damaged threads.

DIAL Indicator Readings

From Front or Rear

- Accurate readings from the front or rear of an IDEAL INDICATOR is especially helpful when locating holes or where the indicator is fastened to a revolving spindle.
- IDEAL INDICATORS have been serving industry for 40 years with complete satisfaction. Prices shown include holder. Why pay more for superior service?



Price . . . \$6.00

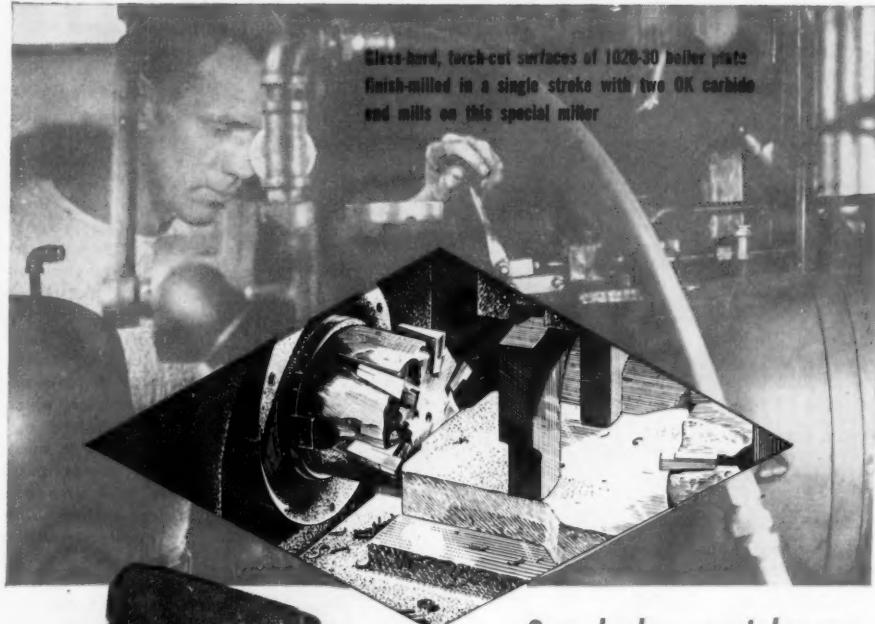
Write for complete details.

IDEAL TOOL CO., 407 RIVER ST., ROCHESTER 12, N. Y.



Twin carbide endmills finish-cut PRODUCTO DIE SET LOCATE PADS with ONE pass

Gloss-hard, torch-cut surfaces of 1020-30 boiler plate
finish-milled in a single stroke with two OK carbide
end mills on this special miller



One duplex special now does the work of four

A special *Producto* twin spindle locate pad miller, equipped with two OK carbide end mills, finish-mills tough, flame-cut 1020-30 boiler plate in one pass quickly and accurately. One of these machines does the work that formerly required four conventional millers using high-speed steel blades.

Note how firmly the workpiece is anchored with an air-powered clamp. Positive parallelism is assured by the use of opposing spindles. Depth of cut varies 1/8 to 1 1/4", at a feed rate of 30" per minute. Cutters are standard OK end mills with 6 carbide blades.

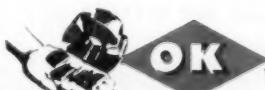
They have all the famous OK features: 1) Two components — body and blades. 2) No locks, screws, gibbs or gadgets are used or needed. 3) Body is forged and built with more beef in back of each blade. 4) OK cutters pack more blades for finishing cuts and heavier blades for roughing cuts.

Write for OK Tool Catalogs

**modern milling cutters
for modern milling machines**

THE OK TOOL COMPANY INC., Milford, New Hampshire

TWO COMPONENTS—
BODY AND
BLADES



ON EXHIBIT AT THE METAL SHOW

A "sneak preview" of a new product for the heat treating industry will be featured in Booth No. 1646 by the Cambridge Wire Cloth Co., Cambridge, Md. In addition to the sneak preview, the display will include woven wire conveyor belts for combining movement with processing through heat treating and other metalworking processes, special metal fabrications for bulk handling, Gripper Woven Wire Slings for overhead handling and industrial wire cloth.

An automatic working model of a continuous heat processing unit, performing actual heating, quenching and drawing of representative parts will be displayed in Booth No. 854-F by Selas Corporation of America, Philadelphia, Pa. The operating principle exemplified by the continuous heat processing unit will be translated into production installations through the use of transparency illustrations. Various burner designs, for numerous high-speed heating installations, will be in operation displaying various heat patterns and characteristics. A combustion controller, which delivers desired air-gas mixtures to burners at preset pressures, will operate in conjunction with the burner assembly. Also shown will be representative Selas heat processing installations covering such applications as various continuous heat treating operations, strip annealing, galvanizing, heating for hot and cold working, roll hardening and several types of brazing. Production specimens will be available for examination, including brass strip produced by continuous annealing. Qualified personnel will be present to discuss heat processing methods and their applications.

Precise
LOWEST COST
PRECISION
FOR TOOL ROOM AND PRODUCTION



SUPER 30 POWER QUILL

UP TO 45,000 R.P.M. AND 1/4 H.P. ON AC/DC. Only PRECISE has the speed, power and precision needed to turn Tungsten Carbide Mills as well as all other rotary tools with shank diameters to 1/4". Grind, mill, finish, polish any material from wood to the hardest alloy steel. MODELS SUPER 30 and SUPER 40 are for hand applications or machine set-ups; PRECISE SUPER 50 is for heavy duty in machine set-ups. Precision quills and chucks; lifetime-lubricated, micro-precision bearings; machined metal housings. Mounts and accessories for each model extend versatility on standard machine tools.



SUPER 40 GRINDER MILLER

PRECISE PRODUCTS CORP. 1345 Clark St., Racine, Wis.



PRECISE SUPER 30
45,000 R.P.M.
and 1/5 H.P. in 35
oz. Draw collet.

Write FOR CATALOG

OFF-SHELF DELIVERY!

New
COMPACT DESIGN
SAVES UP TO
40% SPACE!

Proven
PERFORMANCE
WITH EXTRA HIGH
SAFETY FACTOR!

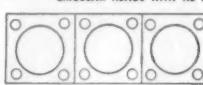
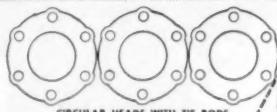
T-J Spacemaker CYLINDERS

OIL pressure to 750 - AIR to 200 P. S. I.

Now the sensational new T-J Spacemaker sets the pace in compact cylinder design and efficient performance!

New "Self-Aligning" adjustable oil cushion means faster acceleration and better cushion than ever before . . . New T-J Super Cushion Flexible Seals for air insure positive cushion with automatic valve action for fast return stroke.

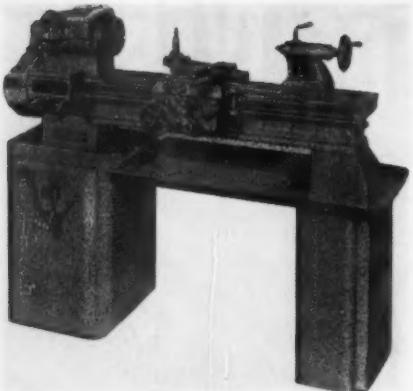
More plus features include—heavy wall, precision honed, hard chrome plated, seamless steel body . . . leakproof cylinder head to body construction . . . heavy duty, high-tensile, hard chrome plated piston rod. Write for bulletin SM-454-2. The Tomkins-Johnson Co., Jackson, Mich.



T-J SPACEMAKER . . . provides additional room for adjacent equipment without sacrificing strength.

TOMKINS-JOHNSON
VISITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHERS

ON EXHIBIT AT THE METAL SHOW



take-up for adjustment and wear, minimizing bearing maintenance. The apron is double-walled and has a friction disc-type clutch for engaging with power longitudinal and power cross feeds. Double neoprene cog-V-belts of the spindle provide maximum pulling power and long belt life. The quick-change gearbox has 54 different threads and pitches with many special "hard-to-get" threads. Rapid selection of pitches and feeds can be readily made while the machine is in operation.

Featuring an exhibit of six machine tools in actual operation, Sheldon Machine Co., Chicago, Ill., will show two new lathes in Booth No. 1059. This display of lathes, milling machines and shapers will include the first showing of the 13-in. Sheldon UM56P Lathe (illustrated) which features a new pedestal design and which has 34 in. between centers. The new 15-in. Sebastian Geared Head Lathe will also be on display for the first time. Featuring greater operator convenience, the new pedestal mounting for Sheldon lathes is sturdy and functional in design. The heavy cast iron pedestal fully encloses the motor and drive. The tailstock leg provides a large storage space for the convenient storage of tools and accessories. Other features of the new lathes include "Zero Precision" tapered roller bearings. The heavy bearings have a single

Punches Shaped from the SOLID with OTTMANN Punch Shaper

FEATURES:

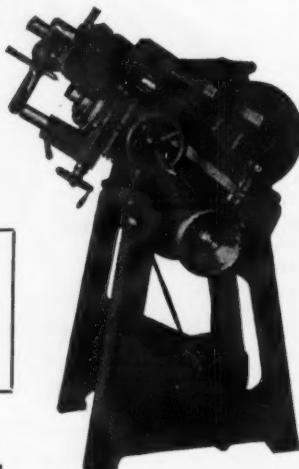
1. No holder plates required.
2. Simple work mounting.
3. No re-setting — Work can be adjusted to any position of tool.
4. Forms shaped accurate. Parallel and true.
5. Minimum hand work.
6. Convenient, simple operation. Uses standard shaping tools.

Write for Literature

CEDAR-WEST TOOL CO., INC.

90 WEST ST.

NEW YORK 6, N. Y.

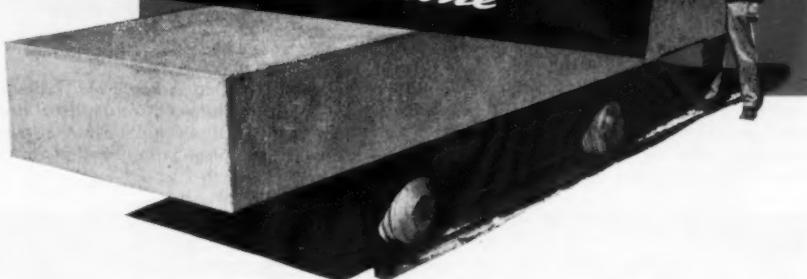




Hard as they come...

but always on the level

An oversize granite plate
by Herman Stone



Granite Surface Plates perfected by Herman Stone are the most accurate standard of measurement you can use. Here's why: Granite is harder than most any type of

tool steel. It stays as level as Herman Stone grinds it—and that's really level! The 25-ton oversize plate shown here has a mean overall tolerance of .005!

- ✓ **Granite is Changeless**—cannot warp and is not affected by stain. Herman Stone selects only the most perfect even-textured granite.
- ✓ **Permanently Level**—Granite won't wedge!
- ✓ **Longer Wearing**—Granite is harder than most tool steels. Won't rust—non-magnetic.
- ✓ **Practically no maintenance costs!**

Easy to clean. Less inspection needed (for you know it cannot warp, dent or bulge). Less resurfacing—some Herman Stone Plates have been in constant use for more than 12 years without a single resurfacing! Think of the time and money saved!

Let us advise you on your surface plate needs. Regular sizes, both pink and grey, are carried in stock. Oversize plates are made to order. Write for descriptive folders. No obligation.

The Herman Stone Co.

324 Harries Building, Dayton 2, Ohio

First in the Field—Still First in Quality

ON EXHIBIT AT THE METAL SHOW

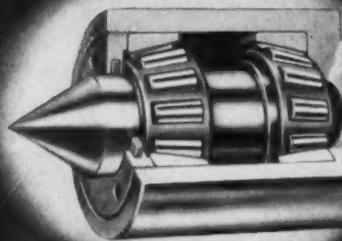


Belted and motorized precision spindles, dynamically balanced, which can be used as replacement units or in new machines will be exhibited in Booth No. 1028 by The Standard Electrical Tool Co., Cincinnati, Ohio. The spindles are available in sizes ranging from small wheel units to spindles powered by 50-h.p. motors. The accompanying illustration shows (A) a special design of precision spindle used in a vertical position as a heavy-duty work head; (B) an extra heavy-duty precision spindle used horizontally as a work head; (C) a precision motorized spindle with an adapter designed for internal grinding on a horizontal boring, drilling and milling machine; and (D) a precision spindle with wheel flanges.

S. B. Whistler & Sons, Inc., Buffalo, N. Y., will have a press operating in Booth No. 135 where the assembly and working advantages of Whistler Adjustable and Magnetic Dies will be clearly demonstrated under production conditions. Plant production executives will have their every question answered both visually and orally as to what Whistler equipment can contribute to their particular manufacturing problems.

... accurate beyond comparison

Falls ROTO CENTER



Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.

for
lathe and grinder
tail stocks



FREE BULLETIN 105

"What you should know
about LIVE CENTERS"

FALLS PRODUCTS, INC., 124 Genoa Street, GENOA, ILL., U.S.A.

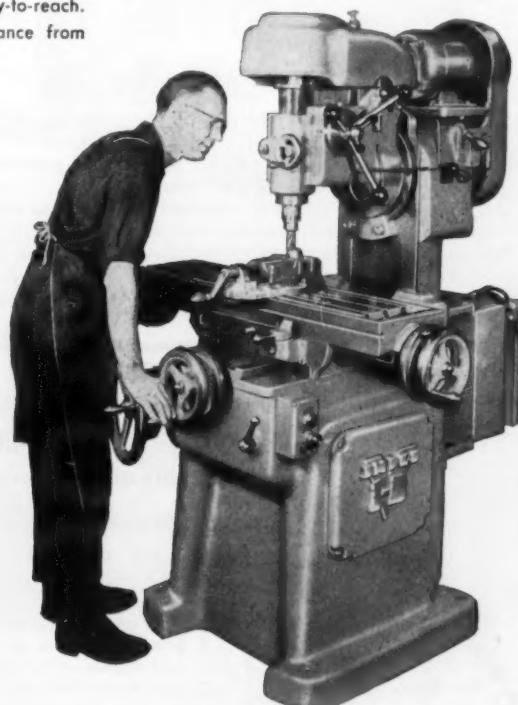
Here's New Operating Ease in a Vertical Mill

- The head of the IMPCo Model 1-B Vertical Mill is vertically adjusted by a counter-balanced ram. The table does NOT move vertically.
- Dials are extra-large, easy-to-read for greater accuracy and operating ease.
- A Shot-Pin gives positive vertical spindle alignment after angular milling operations without indicating the table.
- One shot lubrication system.
- Controls are centralized, easy-to-reach. They remain the same distance from the floor at all times.

Get all the facts.

Write for Bulletin

MM-103.



IMPCO

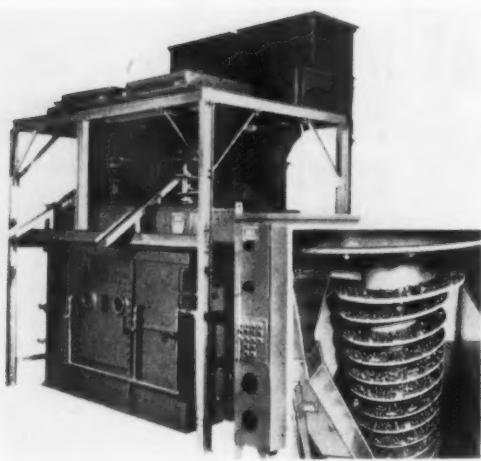
INDUSTRIAL METAL PRODUCTS CORPORATION

Builders of IMPCO Straighteners, the American HEB Pilot Lathe, and Special Machinery

3412 W. ST. JOSEPH STREET

LANSING, MICHIGAN

ON EXHIBIT AT THE METAL SHOW



magnet which is energized by a pulsating current. The speed of the spiral elevator can be varied by a selector switch in the machine's control box.

The basic motive principle of vibration is claimed to maintain a constant flow of work into and out of the degreaser, thereby eliminating overloading or shock loads. The machine is furnished with a complete control unit, including an off-on switch, fuses and selenium rectifiers, requiring either 220 or 440-volt single-phase 18-amp. a.c. electrical connections. The unit may be heated by either gas, steam or electricity. Heating elements are interchangeable.

WHY ARE MORE SOLD? WE EARN YOU MORE MONEY.
USE COIL STOCK—STRAIGHTEN BEFORE FEEDING INTO PRESS



(SHOWN WITH GEAR COVER REMOVED)

2" SIZE **\$225.00**

SPERMAN METAL SPECIALTIES

Manufacturer of "MIGHTY MIDGET" Radius and Angle Dressers

2199 EAST 21ST STREET
BROOKLYN 29, NEW YORK

**MOTOR DRIVEN MODEL — WITH
VARIABLE SPEED DRIVE — \$585.00**

2199 EAST 21ST STREET
BROOKLYN 29, NEW YORK

Manufacturer of "MIGHTY MIDGET" Radius and Angle Dressers

In Booth No. 1421, Manufacturers Processing Co., Detroit, Mich., will exhibit the Manpro Vibra-Degreaser, a high production machine in which any combination of degreasing cleaning cycles may be incorporated. The machine is said to be unusually compact, requiring minimum floor space, and minimizes handling in the degreasing of small metal parts. The unit is equipped with a conventional hopper. The parts are drawn from the hopper by an electro-magnetic vibratory feeder which carries the work at a constant and controlled rate through a chute and into a pan at the bottom of a spiral elevator. The elevator carries the work up through the cleaning cycle to the discharge point. The elevator is attached to flexible leaf springs and is vibrated at a high speed by an electro-

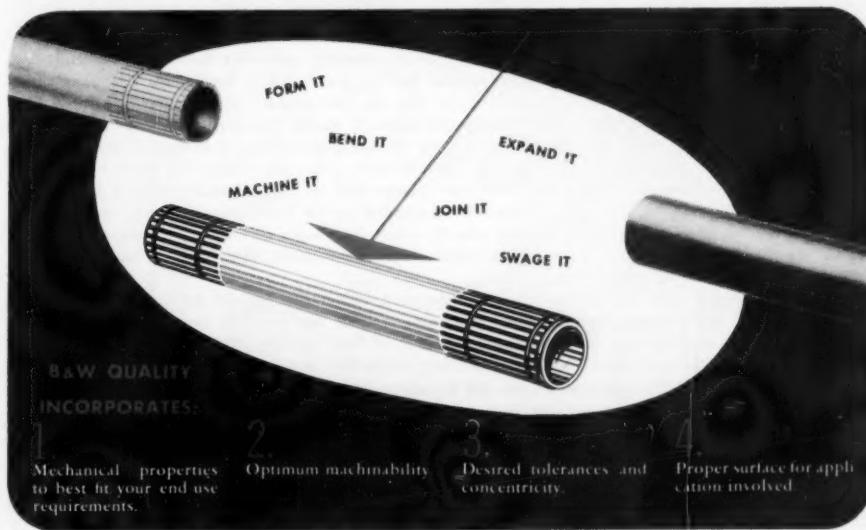
QUALITY in B & W CARBON STEEL

SEAMLESS
MECHANICAL TUBING

Makes Your Fabricating Easy

A
S
Q

AVAILABILITY
SERVICE
QUALITY



1. Mechanical properties to best fit your end use requirements.

2. Optimum machinability

3. Desired tolerances and concentricity.

4. Proper surface for application involved.

remember  is meant for you

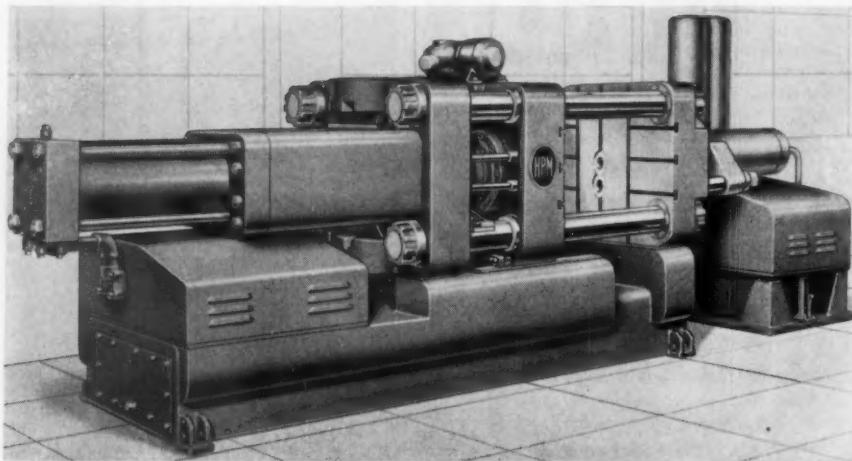
THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION

Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing



TA-4051 (CSM)

ON EXHIBIT AT THE METAL SHOW



First official showing of the radically new line of die casting machines designed and built by The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, will be exhibited in Booth No. 109. The new cold chamber, high pressure, die casting machine line was developed to fill a definite need for die casting equipment to parallel technological advances in nonferrous metallurgy and in the die casting process. Machines feature an all-new clamp design and advanced-design injection ends. The clamp offers a combination of hydraulics for smooth, precisely controlled movements and transmission of energy with a simple mechanical linkage and wedge for multiplication of power, resulting in the storage of potential energy. Maintenance on the mechanics in the clamp is held to a minimum because there are no toggle pins to shear, no single line bearing contacts and no highly stressed members under heavy loads. Automatic lubrication using moly-disulphide lubricants resists friction over large contact areas.

The new injection end is a compact, self-contained unit—a complete package power unit, including pump, motor and reservoir. This compactness was designed to reduce line breaks or leaks, inherent in die casting injection ends because of high speeds and pressures. The injection end features a special speed control operating valve that provides for variable acceleration and speed control. Other advantages of the injection end include ease of positioning, accessibility for servicing, constant and positive plunger movement and maximum required speeds

Multiform
BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

AIR OR HAND MODELS FOR UP TO
1/4" to 4" MATERIAL

Write for brochure which illustrates
and describes the four bender models.

J. A. RICHARDS CO.
Dept. 6-M
Kalamazoo, Mich.

FORMED COMPLETE-AUTOMATICALLY!

NILSON FOUR-SLIDES

**Combine Operations to Lower Costs
on Metal Stampings.**

ONE Nilson 4-Slide with ONE operator forms parts *faster*, more accurately with less rejects than with conventional presses.

Elimination of secondary handling, lower tooling and set up costs means *added profits*. Wide range of models for wire and ribbon metals. Feed lengths to 32", stock widths to 3½".

Press capacity to 75 tons.

For specific recommendations — send details of your operation.

THE A. H. NILSON MACHINE COMPANY

Write, Wire, Phone
for full particulars.

1514 Railroad Avenue • Bridgeport 5, Connecticut

Automatic Chain-Making Machines • Automatic Staple Forming Machines • Wire and Stock Tools • Foot Presses • Wire Straightening Equipment • Slide Feeds for Presses

ON EXHIBIT AT THE METAL SHOW

for all die casting alloys, including aluminum and magnesium. All high pressure hydraulics are manifolded for compactness, elimination of line breaks and maximum safety. A 400-ton model machine in dry cycle operation to point out the features in its new die casting machine line will be displayed. The new line consists of cold chamber models from 200 to 1,000 tons and Goose-neck models from 100 to 600-ton machines. The company will also feature its line of hydraulic components, including hydraulic pumps and motors, cylinders, valves, power units and hydraulic circuit accessories.

A new line of magnesium mill products produced at its Madison Division will be highlighted at the display of The Dow Chemical Co., Midland, Michigan, in Booth No. 620. The booth will contain representative examples from the new production equipment in operation at the company's modern magnesium mill products plant at Madison, Illinois. The products include tread plate, tooling plate, flat sheet and plate, coils and various extruded shapes. In addition, Dow will display cast magnesium products and fabricated assemblies manufactured by other Dow plants. Consumer and industrial products utilizing magnesium to a major extent in their construction will be featured. The entire floor of the booth will be covered with magnesium tread plate, believed to be the first such flooring to be used at a Metal Exposition booth. A completely assembled truck body employing monocoque construction will be on display. The monocoque principle utilizes thick sheet to provide the necessary rigidity and thus eliminates the need for expensive internal bracing.

Looking for Technical Information on Circular and Diametral Pitch Knurling?

CIRCULAR AND DIAMETRAL PITCH KNURLING

The engineering data contained in the booklet has been prepared by our engineers to provide a source of condensed technical information for design and manufacturing of dies and tools used in the application of circular and diametral pitch knurling.

Although knurling has been used for many years, only recently has been the interest in this process increased. The development of dies and tools for this application has been slow. The information contained in this booklet is the result of the work of the Reed company and the many years of experience in the design and manufacture of dies and tools for the production of circular and diametral pitch knurling.

The effects of the Reed company are described throughout the book and the effects of other companies are also mentioned. The book also contains information on the use of dies and tools for the production of circular and diametral pitch knurling. The book also contains information on the use of dies and tools for the production of circular and diametral pitch knurling.



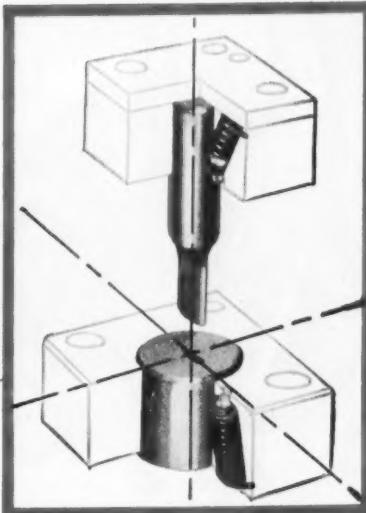
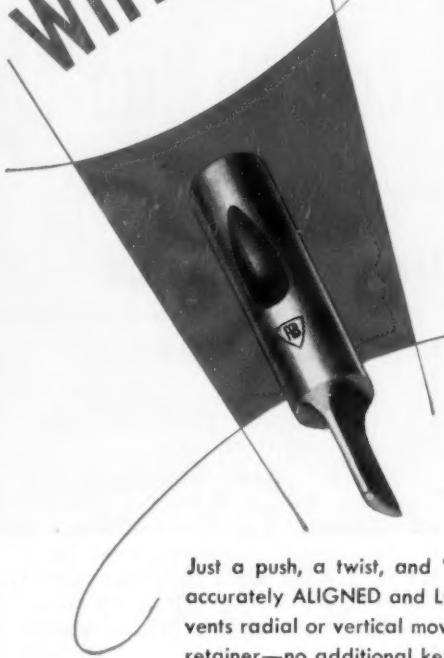
REED ROLLED THREAD DIE CO.
MANUFACTURERS OF ROLLED THREAD DIES
AND ROLLED THREAD ATTACHMENTS
WORCESTER, MASSACHUSETTS, U.S.A.

The engineering data contained in this booklet on Circular and Diametral Pitch Knurling provides a source of condensed technical information about the process and its use. Write Today for "Knurl Data 50-10"

REED ROLLED THREAD DIE CO.

THREAD ROLLING MACHINES AND DIES, THREAD ROLLING ATTACHMENTS,
THREAD ROLLS AND KNURLS FOR AUTOMATIC SCREW MACHINES AND TURRET LATHES
WORCESTER, MASSACHUSETTS, U.S.A.

WHY R-B Punches are easier to use



Just a push, a twist, and "click" your R-B punch or die button is accurately ALIGNED and LOCKED in place. The R-B ball lock prevents radial or vertical movement of the punch or die button in the retainer—no additional keying is required.

R-B punches and die buttons are just as easy to remove—simply insert tanged tool in retainer hole to release ball lock. Standardized and completely interchangeable in any shape or size, these easy to use punches and die buttons save your time and energy.

RICHARD BROTHERS PUNCH DIVISION

ALLIED PRODUCTS CORPORATION
DEPT. 74 • 12625 BURT RD. • DETROIT 23, MICHIGAN

Please send me additional information.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____

ZONE _____ STATE _____



Also Produced in OTHER ALLIED PLANTS

SPECIAL COLD FORGED PARTS

STANDARD CAP SCREWS

PRECISION GROUND PARTS

SHEET METAL DIES
MADE OF FERROUS ALLOYS,
ZINC ALLOYS OR PLASTICS

Star Quality Costs No More



why not get these
**SAFE,
UNBREAKABLE**
high speed blades
from your **STAR Distributor?**

For over 75 years, industry has known
STAR Hand and Power Hacksaw
Blades as *quality* blades.

Here, as an example, is the **STAR** Unbreakable High Speed Steel Blade — safe, fast-cutting, long-lived. The **STAR** combination of a flexible steel back, special-process weld and high speed steel cutting edge adds up to an efficient, shatterproof, proved-quality blade.

STAR SERVICE COSTS NO MORE

Order any of the complete line of **STAR** Blades from your Industrial Distributor — your best source of supply for hundreds of the items you need to operate efficiently, economically, and without production interruptions.

Sold Only Through Recognized Distributors

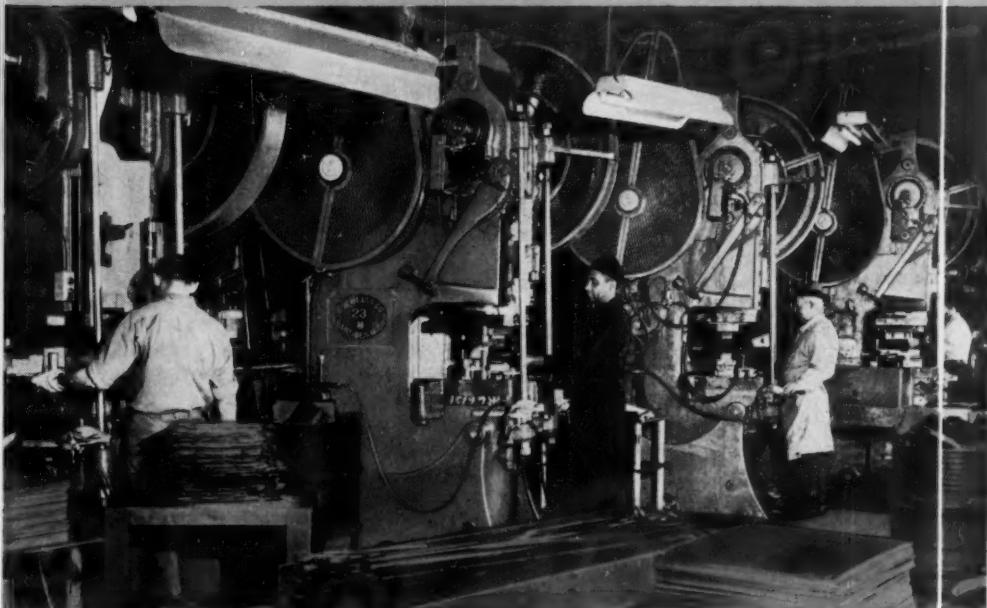
CLEMSON BROS., Inc.

MIDDLETOWN, N. Y., U.S.A.

Makers of Hand and Power Hack Saw
Blades, Frames, Metal Cutting Band
Saws and Clemson Hand and Power
Lawn Machines.



At Art Steel Company, too, **BLISS** Presses Predominate



97% are Bliss-Built



Now, Art Steel Company, one of the leading manufacturers of steel office equipment—*Steelmaster*—credits Bliss with an important role in its progress. For Art

Steel has looked to Bliss since 1923 for engineering counsel and the right press for each operation. Seventy-three Bliss presses making up 97% of Art Steel's press equipment attest to the fact that Bliss has justified this confidence.

Asked why the continued preference for Bliss presses, Art Steel officials sum it up in one word—"dependability".

And that's why hundreds of sheet metal plants throughout this country specify Bliss presses more than any others. Whether your requirements involve mechanical or hydraulic presses, it pays to call for a Bliss engineer. He can show you why Bliss belongs in your press room, too.

BLISS

on your press is more than a name... it's a guarantee

**E. W. BLISS COMPANY, Canton, Ohio
PRESSES, ROLLING MILLS, SPECIAL MACHINERY**

subsidiary: The Die Supply Co., Cleveland, O. • E. W. Bliss (England) Ltd., Derby • E. W. Bliss Company (Paris) France
U. S. Plants in Canton, Salem and Toledo, Ohio; and Hastings, Michigan; San Jose, Cal. Branch Offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Toronto, Canada.

modern equipment at work

Mar-Free Bends Produced in Precoated Lock-Seam Tubing

QUAKER Stretcher Company of Kenosha, Wisconsin, manufacturer of curtain stretchers, folding tables and servette trays of various types, has economically and efficiently solved the problem of producing mar-free bends in precoated tubing with-

out damaging the enamel finish, through the use of two small Pines Series 1400 semi-automatic benders. High quality, mar-free bends in TV servette tray legs are being produced at Quaker on the compact Pines machines at net production rates of 432 bends per hour with women operators.

In Fig. 1, the two Pines machines are shown forming two smooth 90-degree bends on a 2½-in. center line ra-

Fig. 1—Overall view of Pines Series 1400 production bender installation at Quaker Stretcher Co., Kenosha, Wisconsin.





dius in $\frac{5}{8}$ x 0.018-in. wall roller-coated lock-seam tubing. The overall size of the tube after bending is 14½ in. wide x 31½ in. long. The initial bend is positioned by slipping the tube over the mandrel rod which is equipped with a stock stop. The second bend, as illustrated in Figs. 2 and 3, is positioned from an adjustable stop attached to the front end of the bending form. The bending is, of course, a draw bending operation, and smooth, neat bends are formed in the tray legs without marring the black-coated finish on the stock.

In addition to the job described above, Quaker is also forming $\frac{5}{8}$ x 0.050-in. welded-seam tubing on the Pines machines at a $\frac{3}{4}$ in. center line radius without mandrels. The stock thus formed is not as smooth as with a mandrel, but the slight flattening that results is satisfactory since the bend forms the bottom of the legs

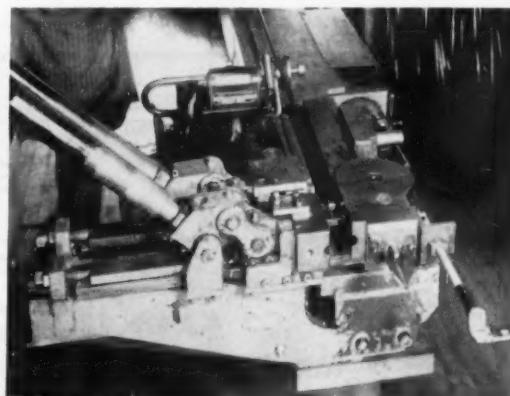
Fig. 2 — Close-up view of Pines bender, showing easy-operating manual toggles and simple tooling. Plug mandrel and Ampco bronze wiper die produce smooth, marr-free bends in precoated stock.

Fig. 3—View of Pines bender, showing cycle control lever arranged on special bracket. This arrangement enables operator to load, clamp and unclamp the work from a convenient operating position.

for the trays. Some 17-in. stock is also formed to a 2½-in. center line radius.

Both operators handle the bending jobs from a position at the front of the machines, and, to make clamping and unclamping of the work-pieces easier and faster, the quick-operating manual toggle clamp levers are equipped with rubber hose-type covers. The cycle control lever on each machine is arranged on a special bracket, as shown in Fig. 3, to enable the operator to load, clamp and unclamp work from a convenient operating position.

The machines have now been in operation at Quaker for a period of over two years without any serious maintenance problems. Hydraulic actuation assures accuracy and low operating cost. Ampco bronze wiper dies have afforded best results at Quaker, producing approximately 7,000 pieces per die before resetting is necessary.



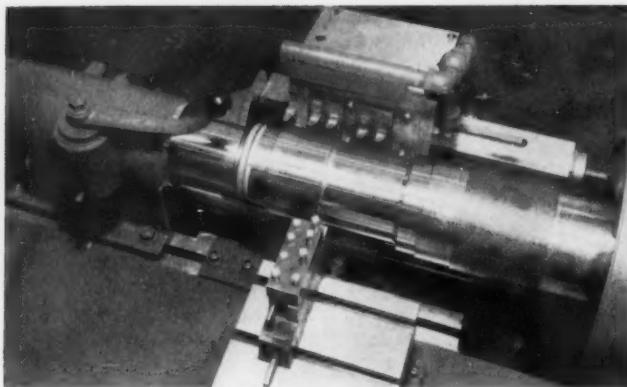


Fig. 1—Four successively-fed cutting tools on this Gisholt No. 12 hydraulic automatic lathe machine a deep contour in the heavy cylinder in a single pass.

Special Tooling Arrangement Permits Deep Contour Cuts in Single Lathe Pass

THIS article discusses how one manufacturer makes a deep contour cut on a heavy cylinder in one lathe pass. Four carbide-tipped cutting tools are mounted in individual cam-controlled sliding tool blocks on the front carriage of a Gisholt No. 12 hydraulic automatic lathe, as shown in Fig. 1. As each tool reaches the position shown by the first tool, it is cammed inward to follow the required contour, as indicated in Fig. 2. Because the tools are successively fed and controlled by the cam arrangement, they follow the depth lines as

shown in Fig. 2. A fifth tool finishes the large o. d. at the right end of the workpiece and a single tool on the

rear carriage of the lathe forms the right radius.

The manufacturer, not satisfied with his previous method of machining the workpieces, sought a technique that would speed production of these pieces by contouring in a single operation. The special arrangement of four successively-fed cutting tools was the answer. There was too great a depth of stock to be removed from these $7\frac{1}{2}$ -in. diameter x 28-in. long N.E. No. 8640 cylinders in a single pass with a single tool. With the successive contouring cuts, the four tools remove a total of 36 lb. of metal in 6 minutes. Workpieces rotate at 135 r.p.m. Tools feed into the work at 0.015 i.p.r. and cut at a rate of 265

Air-O-chek GUN **COMPRESSED AIR** **ECONOMY**

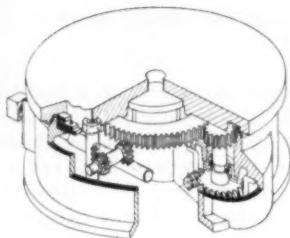
In machine shop and foundry clear away chips, dust, dirt and surplus material quickly . . . AND SAVE through low initial cost, superior performance, low maintenance. Air-O-chek air guns are of simple design, sturdy construction and are easy to use.

AIR-WAY PUMP & EQUIPMENT CO.
1046 N. Kilbourn Ave. Chicago 51, Ill.



new

HYDRAULIC INDEX TABLE WITH BUILT-IN SAFETY FEATURES



✓ SIMPLE DESIGN

Merely a worm and a worm gear.
Notice the cut-away drawing.

✓ COMPLETELY HYDRAULIC OPERATED

The Index Table is driven by a fluid drive motor to provide smooth operation.

✓ PROVIDES YOU MAXIMUM SAFETY

Electrical failures in any unit—engaging fixtures with drill head, while the table is in operation—stops the table automatically.

Now available in four sizes—20", 30", 42" and 60"
Can be bored for any number of stations (2 to 15)



DRILL HEAD CO. Detroit 34, Michigan

engineers and manufacturers of production machines and drilling equipment

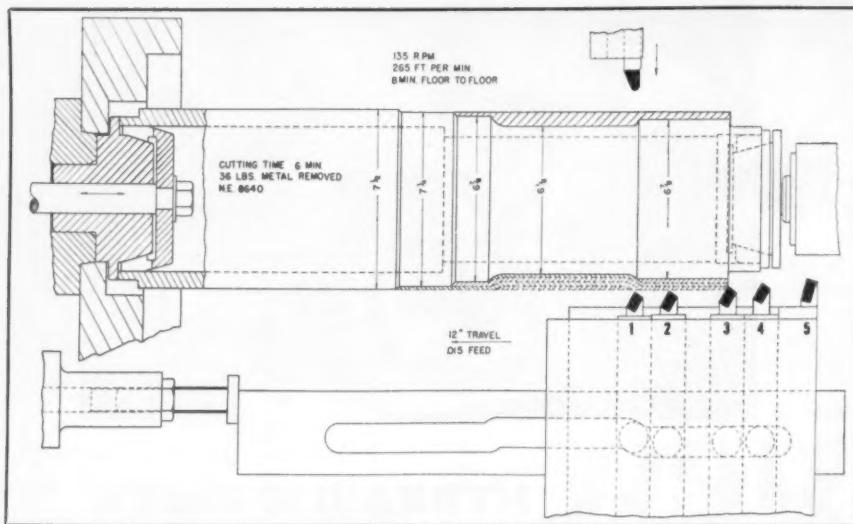


Fig. 2—This cross-sectional view of the cylinder shows total metal removed by successive cuts from tools 1, 2, 3 and 4.

f.p.m. Total floor-to-floor time for this job is only 8 minutes.

There are also other advantages of this method. Tool life is increased since tool load is divided among four tools, and the operator is free to handle another machine which performs an operation on the other ends of the cylinders.

Special Chucking Fixture Increases Production of Hobbed Pinions

A NEW hobbing fixture, specially designed for Allis-Chalmers Mfg. Co., Springfield, Ill., by Scully-Jones and Company, increases production by providing a more powerful and faster method of chucking tractor drive pinions accurately. The new fixture, shown in Fig. 1, utilizes the elasticity of metals to compress a solid inner shell evenly and powerfully around

hub of the pinion, centering it precisely for hobbing. Because it compresses with equal force all around the chucking surface, the fixture, it is claimed, eliminates runout, and pitch-line concentricity of the cut gear is extremely accurate.

Loading and unloading of the pinions is simple and fast since the operator merely twists the actuating ring a few turns to create an extremely accurate and powerful fit. A special lever (see Fig. 1) engages notches in the actuating ring and facilitates actuation and release. Results on this job, according to Allis-Chalmers, is an overall production increase of 10 per cent, plus improved finish and accuracy. Hob life is also improved due to the extremely rigid setup.

Referring to Fig. 2, operation of the fixture is as follows: By turning actuating ring **A** in the opposite direction to the angle of rollers **B** retained in a cage between the chuck body **C** (having outside taper) and actuating



TAPS by CARD

In tapping steel, cast iron, aluminum alloys, bakelite, hard rubber or bronze, the excellence of the machine counts. But in the long run, maximum performance depends on the taps you use. With Card the quality is always assured.



Completely stocked offices at Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco and Seattle



See your local Card distributor for prompt deliveries and helpful service

S. W. CARD MANUFACTURING CO., MANSFIELD, MASS. • DIVISION OF UNION TWIST DRILL CO. • TAPS • Dies • SCREW PLATES

GAMMONS

TAPER REAMERS

for all types of die work



- Specially treated for modern die steels.
- Rapid cutting capacity.
- Large range of standard sizes.
- Tapers per inch: .005, .008, .013.

GAMMONS • HOAGLUND CO.
MANCHESTER 2, CONN.
Manufacturers of helical taper pin, chucking,
die makers and special reamers.

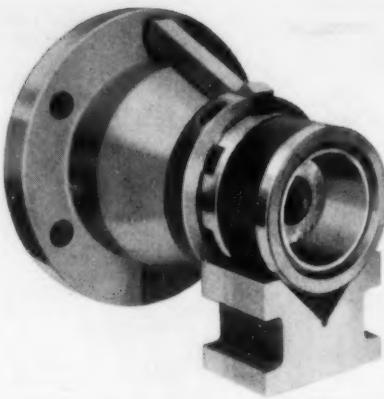
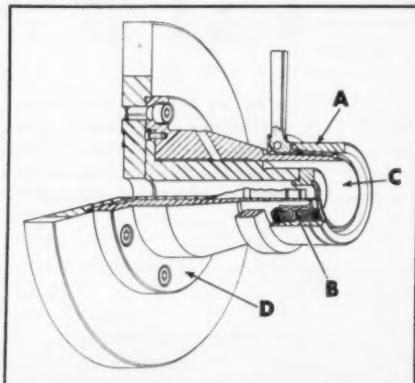


Fig. 1 — Scully-Jones Special "Roll-Lock" Chucking Fixture designed for use by Allis-Chalmers Manufacturing Company in hobbing tractor drive pinions

ring **A** (having inside taper), the outer ring is forced toward the chuck flange **D** as though it was threaded. This creates a powerful wedging action between the two tapers and compresses the wall of the chuck body evenly and powerfully against the

Fig. 2—Drawing showing cutaway view of chucking fixture, including location of precision rollers mounted at slight spiral angle between two tapers. Twisting outer ring causes powerful wedging action between tapers and compresses inner chuck body against work-piece.



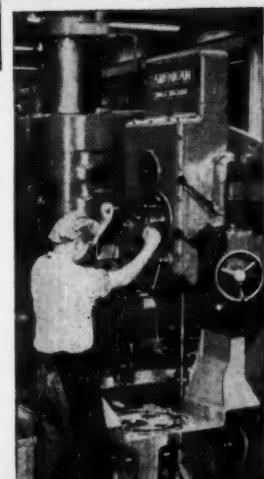


"CATERPILLAR"

"American"

A coalition of outstanding
"name" products dedicated
to the interests of industry.

Here is a "Caterpillar" Diesel DW20 Tractor with
W20 Wagon loading heavy clay for the Garza-Little
Elm Dam near Lewisville, Texas.



The astonishing ease of operation of these units due
to their ultra-modern design makes the "load"
lighter and the cost lower.

For the very same reason "Caterpillar" uses many
"American" Radials. Because of their ultra-modern
design they make the drilling, boring and tapping
"load" lighter in "Caterpillar" plants and keep the
cost of production at a minimum.

Extra power, centralized control, boring mill type
spindle and extra fast tapping are outstanding virtues
of "American" Hole Wizard Radials which swell the
operator's pay envelope and help keep production
on a profitable plane.

For more work, better work and lower cost work, get
the facts about "AMERICAN".

Write No. 327 upon Request.

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio U.S.A.

shaft or hub of the workpiece. The fixture is adapted to different hub lengths by inserting spacers (see Fig. 1) into the chuck body. Different diameter pinions are chucked in the same fixture by means of split type collets.

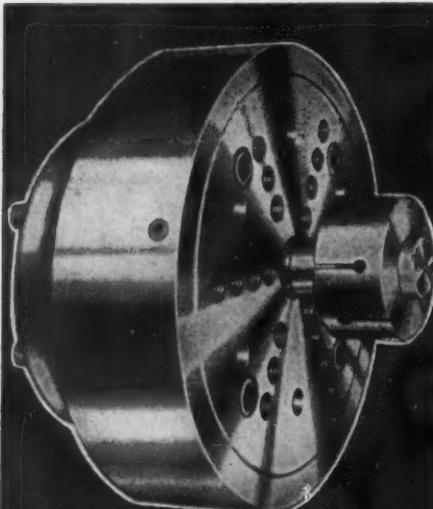
3-D Magnifier Used in Inspecting Precision Aircraft Parts

TO ensure accurate inspection, Pratt & Whitney Aircraft uses a 3-D binocular magnifier, known as a "Magni-Focuser," which is made by Edroy Products Company. The accompanying illustration shows a Pratt & Whitney Aircraft worker inspecting a precision part for an aircraft engine. Advantages of the "Magni-Focuser" are that it allows for free use of both



Pratt & Whitney Aircraft worker uses 3-D binocular magnifier to inspect precision part for an aircraft engine.

hands and that it can be readily worn with or without regular types of eyeglasses.



9 Reasons for You to get the Facts on SPEEDGRIP CHUCKS

1. They increase production.
2. They give greater accuracy.
3. Set-up time is shorter.
4. They are safer to operate.
5. First cost is low.
6. Maintenance cost is low.
7. Design is simple.
8. Guaranteed to do the job.
9. Service is prompt.

Speedgrip Precision Internal Chucks will save you money on second operation work.

WRITE FOR FREE MANUAL



820 N. WARD STREET
ELKHART, INDIANA

SPEEDGRIP CHUCK

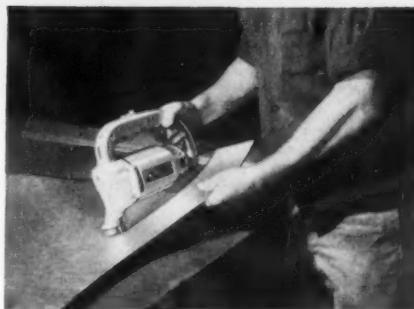
IT'S NEW!



MILLERS FALLS PORTABLE SHEAR

Newest MILLERS FALLS cost-cutting tool for industry

This rugged, high-production tool cuts sheet metal — up to 16 gauge (.060") in steel and galvanized sheet — up to 50% greater in aluminum, copper and other non-ferrous metals. Blade adjustments are quickly made — with hex keys conveniently located in tool handle.



On straight lines or curves, from inside or outside, Millers Falls new No. 16 Portable Electric Shear cuts clean and fast. Weighs only 8 lbs. Minimum radius for left hand cuts is $1/2$ ", for right hand cuts, $1\frac{1}{4}$ ". High cutting-line visibility. Precision-ground, heat-treated alloy steel blades are quickly removed for resharpening. Built to Millers Falls quality standards, the No. 16 Portable Electric Shear is the latest star in a notable line of industrial electric tools.

In power, in quality, in design, the new No. 16 Portable Electric Shear is an outstanding addition to Millers Falls line of electric tools for production and maintenance. Write for full details on Millers Falls high-performance, advanced-design electric tools. Demonstrations quickly arranged on request.

MILLERS FALLS COMPANY
Dept. MM-4, Greenfield, Mass.



The Mark of Superiority



Drawing seamless tubs for the Navy at Polar Ware Corporation, using H-P-M 650-ton deep draw press. Inset shows finished tub which is 24 in. in diameter at the top, 21 in. in diameter at the bottom and 18 in. deep.

Drawing Seamless Tub for the Navy

A TOUGH metal forming problem—making seamless, stainless steel galley tubs for the Navy — has been solved by the Polar Ware Corporation

of Sheboygan, Wisconsin. The company draws the 30-gallon tubs on a 650-ton deep draw press, designed and built by The Hydraulic Press Manufacturing Company of Mount Gilead, Ohio. By the use of the H-P-M press, the tub is now being produced faster

LUERS

PATENTED CUTTING OFF TOOL HOLDERS PATENTED CUTTING OFF BLADES

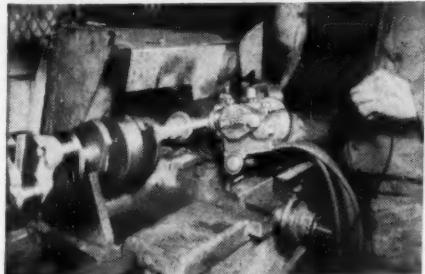
ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured by

J. MILTON LUERS, 12 Pine Street, Mt. Clemens, Mich.

Produced under License Issued by John Milton Luers Parents Inc.

when mistakes happen...



Automotive crankshaft being brought up to inspection standards with metallizing. This automotive manufacturer formerly used plating for this type of salvage, worked one per hour. With metallizing, the salvage operation requires only 5 to 10 minutes per shaft, including surface preparation.

...and they do in any busy machine shop, there's no need to scrap a mis-machined or otherwise damaged machine part that represents an investment of many expensive man-hours.

Parts like these are brought up to inspection standards quickly, easily and inexpensively with metallizing.

And with the new molybdenum metallizing wire, Sprabond, the only surface preparation required is cleaning. The molybdenum forms a molecular bond with the surface being rebuilt. Little heat is generated, eliminating any danger of warpage.

What's more—users have found that the extreme hardness of the molybdenum coating, and its microscopic porosity which provides superior lubricating characteristics, improve its "wear-ability" over ordinary bearing surfaces as much as 25 times. **You haven't just salvaged a part—you've improved it.**

Free Bulletin

Get the full story on metallizing in production salvage. Bulletin 57-C describes and illustrates the procedures, provides data on typical parts, with interesting photo-micrographs showing the unique bonding action of Sprabond Wire. Send for a copy.



The trade name, SPRABOND WIRE, is the property of Metallizing Engineering Co., Inc.

DON A. WATSON
METALLIZING ENGINEERING CO., INC.

1111 Prospect Ave., Westbury, Long Island, N. Y.

Please send me Bulletin 57-C.

Please have Metco Field Engineer call.

Name _____

Company _____

Street _____

City _____ Zone _____ State _____



Metallizing Engineering Co., Inc.

1111 Prospect Ave., Westbury, L. I., New York • cable: METCO
In Great Britain:
METALLIZING EQUIPMENT COMPANY, LTD. — Chobham near Woking, England

and at less cost than with the previous method of rolling it out of stainless steel and then seam welding the assembly.

Each finished tub is 24 in. in diameter at the top, 21 in. in diameter at the bottom, and 18 in. deep. The press has a 30-in. stroke, and the total draw on the tubs is 18 inches. After final drawing on the press, the tub is rolled at the top, a stainless steel band

is spot welded on for the base, and handles are attached to complete the assembly.

Automatic Broaching of Electric Motor Stators

A COMPLETELY automatic vertical hydraulic 3-way type broaching machine built by American Broach

and Machine Company is used to broach the i.d. of laminated stators for electrical motors. Designed to fit into a conveyor line, the machine features an automatic loading and ejection mechanism that makes it possible to operate the machine on a continuous automatic cycle.

Parts coming into the machine on the conveyor line are shuttled into broaching position by a hydraulic cylinder interlocked to the machine cycle. A broach retriever lowers the broach shank or arbor through the part until it connects with the automatic pull-down head. The broach is then pulled down through the part, finishing the inside laminated surfaces.

1
NEWCOMER
ECONO-CLAMP
TOOLS



2 revolutionary
ways to beat
production costs

2
NEWCOMER
"THROWWAY"
CARBIDE INSERTS

*Available in all styles for Heavy
Duty Roughing and Accurate Finishing*

ELIMINATE GRINDING . . . SPEED PRODUCTION

Here's why modern mass production facilities are saving up to 50% on carbide tooling costs with Newcomer Econo-Clamp Tools and "Throwway" Carbide Inserts.

- Ruggedly designed alloy steel holder gives maximum strength.
- Top clamp locates cutting edge accurately after each indexing.
- Hardened steel anvil furnishes a solid, flat seating surface for half length or "Throwway" inserts.
- "Throwway" Inserts give multiple cutting edges without grinding.
- One holder uses a full length, half length or "Throwway" insert.

SEND
TODAY
FOR
BULLETIN.



NEWCOMER PRODUCTS, INC.

LATROBE, PENNSYLVANIA

General Sales Office: 512 Franklin Ave., Pittsburgh 21, Pa.

ACCURACY

HARTFORD

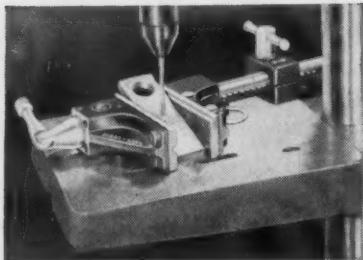
Special

SUPER-SPACERS

In the field of precision machine tools and fixtures, the name Hartford is synonymous with accuracy. Since 1885, the Hartford Special Machinery Company has been a leader in the development of precision fixtures and tooling for the aircraft, automotive, electrical, and general industries. The company's reputation for accuracy is based on the use of the latest in design, materials, and manufacturing techniques. The company's products are used in a wide variety of applications, including aircraft, automotive, electrical, and general industries. The company's products are used in a wide variety of applications, including aircraft, automotive, electrical, and general industries.

THE HARTFORD SPECIAL MACHINERY CO., HARTFORD 12, CONN.

VERSATILE VISE can repay its cost the very first day!

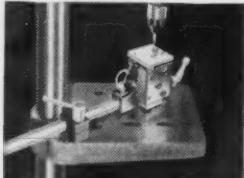


PREVENTS ACCIDENTS—This full-floating, securely anchored drill press safety vise holds work, including sheet metal, for drilling in many positions . . . keeps it from flying off the table.

CUTS JIG COSTS—Serves as base and instant-opening mechanism for low-cost jig . . . cuts jig parts and costs by as much as 80%.

SPEEDS SET-UPS—Ratchet-locking jaw slides instantly from maximum (9° or 12°) opening to any position. A $\frac{1}{4}$ -turn of the handle and screw-actuated jaw positively grips or releases work, including round stock.

Ask your distributor for a demonstration or write us for folder W-50.



Above:
Angle Drilling

Below:
Low-Cost Jig

WAHLSTROM/FLOAT-LOCK SALES DEPT.
AMERICAN MACHINE & FOUNDRY COMPANY

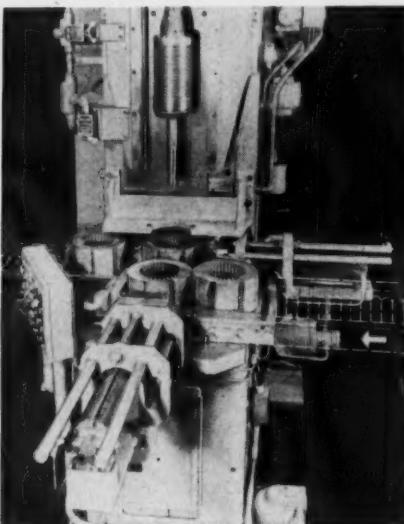
Room 22, 261 Madison Ave., New York 16, N. Y.

Another  Product

Float-LOCK
SAFETY VISES

of the stator. With the broach in down position, free of the part, a second hydraulic cylinder ejects the part out of broaching position onto the conveyor line. The broach is then returned to the broach retriever, which raises it to starting position, completing one cycle. The cycle automatically repeats as long as parts are fed to the machine by the conveyor line.

Tooling includes various sized



Close-up view of automatic vertical hydraulic 3-way type broaching machine, showing manner in which laminated stators are shuttled into broaching position by a hydraulic cylinder interlocked to the machine cycle

broach shells for broaching similar stator parts, which adapt to a common broach arbor. The broach retriever is mounted on its own ways, separate from the machine slide, and is designed with an extra stroke to follow the broach through the principal portion of the broaching stroke. Under ideal conditions, a production rate of over 200 parts per hour can be maintained.

B-RIGHT-ON®

SOCKET SCREW PRODUCTS

always measure up!



Socket screw users who want *what they want when they want it* know it pays to specify B-RIGHT-ON! Brighton Socket Screw Products *always measure up*.

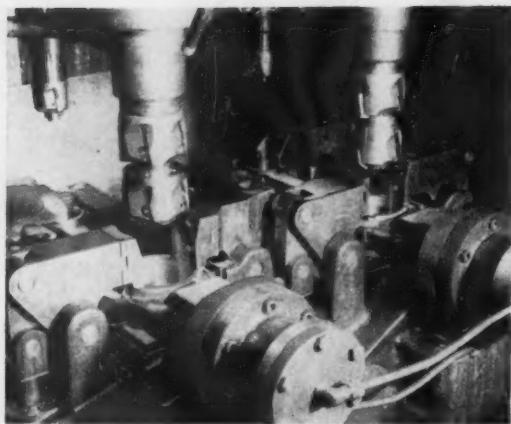
Standard or special, Brighton Screws must meet and pass factory standards that are higher even than those specified by the ultimate user of the screws. Rigid control, from initial steel selection to final packaging, certifies every screw as B-RIGHT-ON quality. Selected mill supply houses, Brighton distributors, complete the control chain, assure the user of service and delivery as dependable as the screws . . . B-RIGHT-ON service.

Write for descriptive literature...see how

**YOU CAN DO BETTER
WITH B-RIGHT-ON.**

**THE BRIGHTON SCREW
& MANUFACTURING CO.**

READING RD. AT DORCHESTER
CINCINNATI 2, OHIO



Tool Change Results in Connecting Rod Production Increase

A COMPLETE tool change recently on connecting rod crank and pin hole roughing and finishing operations has resulted in a 30 per cent increase in hourly part production at Caterpillar Tractor Co., Peoria, Ill. Previous tooling, which minimized feed to 3 in. per minute on two-spindle W. F. & John Barnes boring machines, produced only 12 parts per hour. New tooling on four-spindle W. F. & John Barnes boring machines employing Wesson metal solid carbide blades has increased production from 80 to 280 pieces per eight-hour shift. The spe-

cial radial and axial rake angles used on the Wesson cutters have resulted in an approximately 40 per cent reduction in grinding time.

The boring machines with Wesson boring heads have increased the feed rate 142 per cent to $7\frac{1}{4}$ in. per minute. This increased feed produces

48 per cent more pieces on one machine than was possible with the previous tooling using two machines. The production increase amounts to 24 pieces per hour on two machines to 36 pieces per hour on one machine in the new setup.

With the previously used tooling, surface speed was held down to 310 on the crank end and 260 on the pin end. The Wesson boring heads have made it possible to increase the speed to 360 on the crank end and 320 on the pin end.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

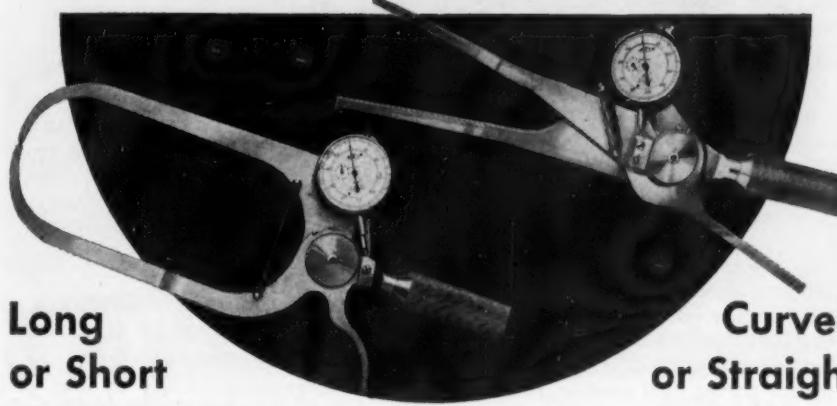
CARROLL AND JAMIESON LATHES

- This 16" lathe is equipped with 12 speed geared head, motor drive, and Timken mounted spindle. It's modern in design — with liberal dimensions.

Write today for descriptive bulletin 39-A-10.

THE CARROLL & JAMIESON MACHINE TOOL CO. BATAVIA, OHIO, U.S.A.

AMES



**Long
or Short**

**Curved
or Straight**

CALIPER GAUGES—Custom-built to fit your exact need.

Whether it's measuring the inside dimensions of a pipe, the wall thickness of a casting, the outside dimensions of a rocket—Ames can build the caliper gauge that fills your requirements.

Ames caliper gauges are made of carefully-finished heavy gauge steel and are equipped with an Ames exclusive: a chordal error correcting cam that assures accurate readings. Ames calipers are available with contacts of various shapes—ball, flat or pointed—made of carbide, hardened steel, or sapphire.

Your measuring problems may involve a caliper gauge. If so, send it to Ames—for a quick, profitable solution.



*Write for your free copy
of Ames catalog*

*Representatives in
principal cities*

B. C. AMES CO.

*29 Ames Street
Waltham 54, Mass.*

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators



news of the industry



Burg Tool Announces Completion of New Offices and Plant

Burg Tool Manufacturing Company, Inc., has announced the completion of new offices and plant, representing the fourth expansion in the 12-year history of the firm. Located at 15001 S. Figueroa Street in Los Angeles, California, the new 22,000 sq. ft. structure is modern in every detail and is laid out for highly efficient production line operation. Burg manufactures 45 different sizes and models of toolholders and four turret drill models. Plans for the future call for a steady expansion in type, size and models of machines.

The company had its beginning in a small garage in the back of F. G. Burg's home in 1942. The space occupied was approximately 200 sq. feet.

Later, progress took a rapid upturn and soon the firm was compelled to move to larger quarters comprising about 2,700 sq. feet. After the introduction of the first models of the firm's turret drill, the company was again forced to move to larger quarters which included some 6,000 sq. feet.

N.M.T.B.A. Completes Glossary of Engineering Terms for Hydraulic Presses

The interchangeability of dies and fixtures between hydraulic and mechanical presses moves a step nearer realization with the announcement by the National Machine Tool Builders' Association of the completion by the Engineering Standards Committee of

New offices and plant of Burg Mig. Co., Inc., Los Angeles, California



WHY IT PAYS TO BUY MX SCREW STOCK FROM US



You get reduced production costs—quick delivery

● Hundreds of shop cases have shown that USS "MX" free-machining bar stock cuts unit costs considerably . . . an average of 10% to 15%, sometimes as high as 42%. And the more machine work your parts require, the greater the savings.

Here's how you cut costs when you use "MX" rather than other free-machining grades. You get more parts per hour, longer tool life with less down time for grinding and adjustment, fewer rejects, closer tolerances and better part finish.

One of our qualified sales representatives will gladly discuss the advantages of "MX" with you as they apply to your particular shop requirements. And you can always depend upon quick delivery from the nearest U.S. Steel Supply warehouse.

In addition to "MX" stock, we carry: cold finished rounds, squares, hexagons, flats and precision shafting in all grades.

U. S. STEEL SUPPLY DIVISION



General Offices: 208 So. La Salle St., Chicago 4, Ill.
Warehouses and Sales Offices Coast to Coast

UNITED STATES STEEL

TRIPLE SECURITY

What you want
When you want it
At the right price



the Hydraulic Press section of the association of a glossary of engineering terms for hydraulic presses. The first of five studies on problems of standardization, the report will shortly be followed by others on metalworking presses (other than vertical open gap), on vertical open gap presses, on compression and plunger molding presses and on accumulators, according to John M. Dolan, chairman of a three-man steering

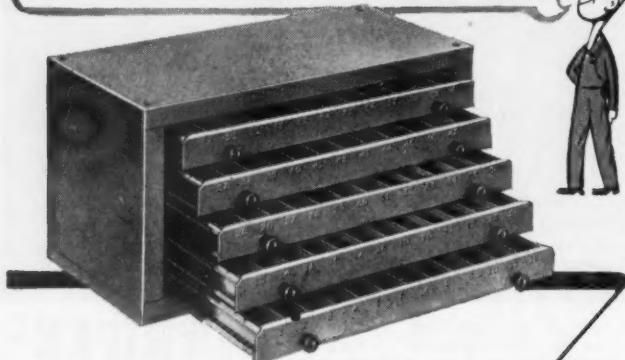
committee of the Hydraulic Press group. Mr. Dolan is vice president and general manager of the Hydraulic Press Manufacturing Company. Other members of his committee are L. Crawford Beatty, president, Beatty Machine & Manufacturing Company, and Charles S. Davis, Jr., vice president, Lake Erie Engineering Corporation.

This first report, on a glossary of engineering terms, is the work of a 21-man subcommittee, representative of as many manufacturers of hydraulic presses.

Under the chairmanship of Harry L. Reynolds, vice president, Verson Allsteel Press Company, the committee has devoted some three years to preparation of the glossary which covers all types of hydraulic and compression molding presses, frame elements, cylinders, press control systems and components, pumps and controls.

Pointing out that agreement on engineering terminology had, of practical necessity, to be reached before much progress could be made on any of the four specific equipment studies,

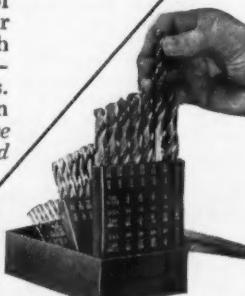
**Drills at your fingertips—
HUOT DRILL DISPENSER**



Why rummage through a box full of drills when the Huot Drill Dispenser will keep them sorted by sizes? Each compartment holds many drills—several dozen in the smaller sizes. Beautiful light gray hammerlin baked enamel finish. *Made in three models for fractional, number and letter drills.*

Write for Drill Dispenser Bulletin

HUOT DRILL INDEX



The simplest filing system for all twist drills. Panels fold into container like pages of a book. Seventeen models for drills from No. 80 wire gauge to 1-inch size.

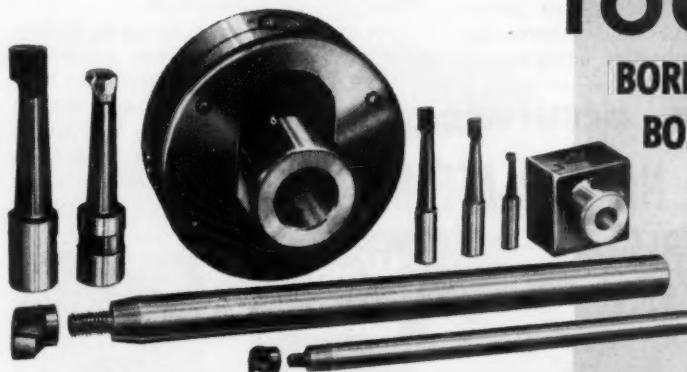
HUOT

HUOT MANUFACTURING CO.
538 North Wheeler Street, St. Paul 4, Minn.

for more *Accurate* cuts...

greater *Rigidity* in

BORING TOOLS



BORING HEADS

BORING BARS

Use CRITERION BORING EQUIPMENT

BORING PROBLEMS? CLOSE TOLERANCE?

Try Criterion Boring Tools. Built with the same care and quality as the time-tested Criterion Boring Head.

THIS COMBINATION WILL PRODUCE RESULTS.

Boring heads from 1½ to 7 inch diameter. Boring tools, carbide or high speed steel, ½ to 1¾ inches diameter. Bore holes from ½ to 20 inch diameter.

Accuracy for the closest tolerance • Rigidity for the heavy cuts • Heat-treated parts for long wear

LARGE OFFSET SAVES TIME AND TOOL CHANGES

These tools will cut your boring costs.

See the complete line of CRITERION TOOL PRODUCTS at your local dealers or write for free catalog.

**CRITERION
MACHINE WORKS**

9312 SANTA MONICA BLVD • BEVERLY HILLS, CALIF.

Chairman Reynolds of the Engineering Standards Committee states that "the establishment of engineering standards for hydraulic presses can now move ahead fairly rapidly. The committee's work on this closely parallels similar studies which have been initiated by the mechanical press manufacturers. When both have been completed it should be possible to effect a substantial degree of interchangeability of dies and fixtures between the two types of equipment."

Published by the National Machine Tool Builders' Association, 2071 E. 102nd St., Cleveland 6, Ohio, as a 40-page, 8½ x 11-in. brochure, the glossary is now available at 75 cents a copy.

James C. Kelley Appointed to Position of General Manager of A.M.T.D.A.

The appointment of James C. Kelley as general manager of the American Machine Tool Distributors' Association has been announced by Thomas R. Rudel, association presi-

for clear, accurate

NAME PLATE MARKING



**Wagner
Electric**
chooses

AUTOMARK
ELECTRIC TYPEWRITER

WAGNER
DISTRIBUTION
TRANSFORMER

For complete details on the Automark metal marking electric typewriter, **WRITE TODAY** for Bulletin 8-16.

"Its accuracy and the uniform clearness of the marking are the features that make it superior to the method previously used," say officials of Wagner Electric Corporation, St. Louis, about the Automark.

This unique detail marking machine employs a standard typewriter keyboard. Light touch on key produces mark by instantaneous electrical response. Production speeded, operator fatigue lessened. Heavy-duty table. Wide range of plate size and thickness. Type sizes from $\frac{1}{16}$ " to $\frac{1}{4}$ ".

DEFIANCE MACHINE & TOOL COMPANY

1924 South Vandeventer Ave. • St. Louis 10, Mo.



James C. Kelley

dent. Mr. Kelley comes to his new post from the Department of Commerce's Metalworking Equipment Division, of which he was deputy director. The division is the government's focal point for industry - government relations. It keeps industry posted, often through trade

EXTRA
LARGE
TABLE

**handles
 unusual
 sizes,
 shapes!**

Big work—bulky shapes—heavy jobs—all can be drilled quicker, easier on the Sibley Model E-25 Drilling Machine. 22" x 30" table; 25" swing; pedestal jack supports table; variable speed drive for drills $1/8$ " to 1"; table alignment to spindle—.0007" in six inch radius; 1 1/2 h.p. motor; convenient speed control; tachometer indicates exact spindle speed.



SIBLEY

MACHINE & FOUNDRY CORP.

SOUTH BEND 23, INDIANA

SIBLEY MACHINE & FOUNDRY CORP.
 Dept. MMS11, South Bend 23, Indiana
 Send complete story on Model E-25 with
 extra large table.

Name _____ Title _____

Company _____

Address _____

City _____ State _____

associations, on marketing data and on new technical developments and legislation. Mr. Kelley, whose first association with the machine tool industry was with the Monarch Machine Tool Co., Sidney, Ohio, was the recipient of the Junior Chamber of Commerce Arthur S. Fleming Award in 1952 as the "outstanding young man in government," for contributions made in the field of metalworking equipment administration.



PIONEER

Offers a Complete
Line of Pumps for
Coolants, Lubricants
and Abrasive
Liquids . . . Over
400 Models Available
. . . Flange-mounted
and Submergible



PIONEER

Impeller Type

0 to 174 gpm—1/2 to 5 hp—850 to 3450 rpm

ROLLWAY Positive Displacement Type

1/8 to 60 gpm—200 to 500 rpm—15 to 35 psi

Model shown above is one of a complete line of flange-mounted type pumps which provides strict conformity to J.I.C. standards.

Send today for this FREE Catalog



PIONEER PUMP DIVISION

Detroit Harvester Company

14300 Tireman Ave. Detroit 28, Michigan

Chicago Wheel Elects New Officers

Chicago Wheel & Manufacturing Company, 60-year-old Chicago manufacturer of grinding wheels and other industrial abrasive products, has announced the election of Arthur J. Miller, Jr., as president and general manager of the company. Mr. Miller, formerly treasurer and factory manager of the company's Valparaiso, Indiana, plant, will succeed A. J. Miller, Sr., who was named chairman of the board. Other officers elected were Henry E. Miller, vice president



Arthur J. Miller, Jr.

and general production manager; Henry M. Mann, treasurer and chief of sales engineering; and Arthur T. Dalton, secretary and general sales manager. I. Danielson, long associated with the firm, was elected vice president emeritus, and will continue on in his capacity of financial advisor.



51 holes in cover and valve body vary in diameter from $\frac{1}{16}$ " to $\frac{13}{16}$ ".

HERE'S HOW ZAGAR TOOLING SAVED MONEY HAND OVER FIST

This aluminum die casting is processed in its entirety by Zagar planning, except for milling two faces. Two lines of Zagar standardized self-clamping drill jigs ream, tap and drill both valve body and cover. With 24 heads and 24 fixtures, Zagar performs work on 51 holes on

close centers. Step tools take care of reaming and burnishing. The fixtures were designed to compensate for slight inaccuracies in the die casting. Thus has Zagar engineering solved an acute problem of limited production without the purchase of costly special machines.

Write for Bulletin S-11.

ZAGAR TOOL, INC.
24000 Lakeland Blvd., Cleveland 23, Ohio

TOOLS FOR INDUSTRY
and SPECIAL MACHINERY

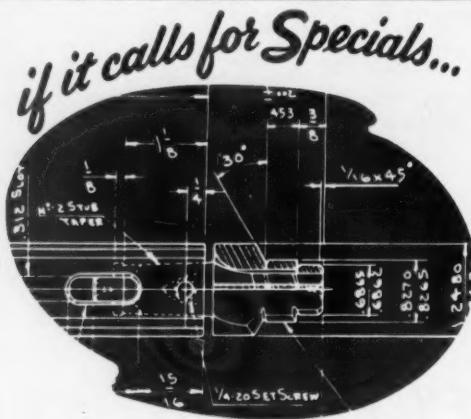
Pressed Metal Institute Elects National Officers

Samuel Morrison, president of Morrison Steel Products, Inc., Buffalo, N.Y., was elected president of the Pressed Metal Institute at its Sixth Annual Meeting held recently at Manoir Richelieu, Murray Bay, Quebec. Elected vice presidents of the institute were J. J. Boehm, president, The Boehm Pressed Steel Co., Cleveland, Ohio; and C. Glenwood Rose, president, Judson and

Rose, Inc., Philadelphia, Pa. W. B. Gemmil, treasurer, The American Stamping Co., Cleveland, Ohio, was elected secretary-treasurer of the institute.

Marc Bendick Elected President of Barnaby Manufacturing Company

At the annual meeting of the board of directors of Barnaby Mfg. Co., Bridgeport, Conn., Marc Bendick was elected president of the company and Barnabus Toth retired as active head of the firm. Mr. Ben-



call on Staples!

Turn troublesome, costly "special" hole production jobs into smooth-running, high-performance operations by taking your problems to Staples Special Tool Design and Engineering Service.

Leaders in the field of circular carbide-tipped tool manufacturing, Staples' expert tool engineers can meet your most rigid specifications with special tool designs that will speed your production and deliver precision results, while reducing your tooling costs.

A brief description of your job requirements will bring a prompt response.

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio

Staples

CARBIDE-TIPPED CUTTING TOOLS

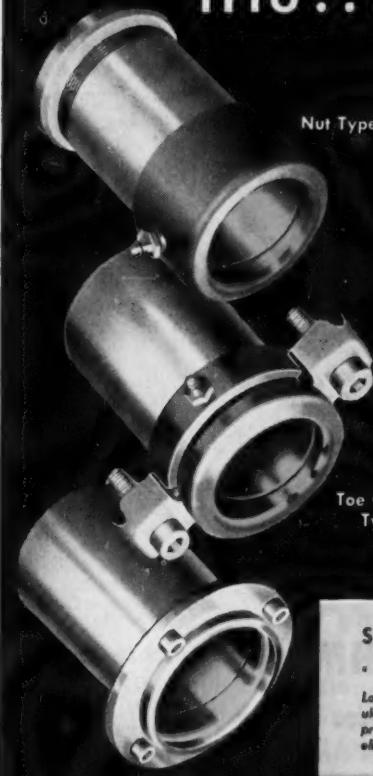
A complete line of Standard Circular
Carbide-Tipped Tools, Expansion Reamers



Marc Bendick

dick recently headed Bridgeport Industries, Stratford, Conn., fabricators of all kinds of aircraft parts. He was president of Stratford Aviation Corporation, a firm specializing in aircraft modification. He is also associated with the McIvers Oil Co., San Antonio, Texas. In addition, he op-

trouble-free trio . . .



Lamina

GUIDE PIN BUSHINGS

with exclusive
bronze-on-steel design

Gone are the headaches and high costs of bushing failures in your die sets when you install Lamina Guide Bushings.

Exclusive design*—long-wearing hardened steel with free-running bronze on the I.D.—adds thousands upon thousands of press strokes to the life of Lamina Guide Bushings. This means important savings both in maintenance costs and lost production time for bushing replacements.

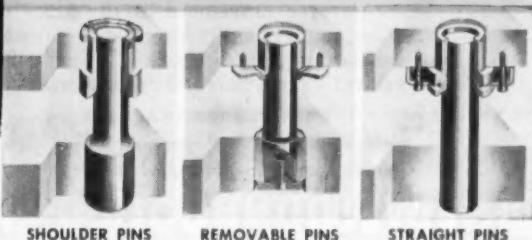
Even more important, with their precision running mates—Lamina pins—these guide bushings consistently boost die life through better die alignment. This means more parts per die sharpening, better quality parts, lower cost per part. Big savings all around.

As illustrated at left, Lamina Bushings come in three styles and all popular sizes. Specify them when ordering die sets. Contact any die set manufacturer or write direct to us for our new free illustrated bulletin and price list.

*Patent Pending

SPECIFY *Lamina* GUIDE PINS, TOO! . . . for precision . . . for longer life.

Lamina Guide Pins are available in the three styles shown and in all popular sizes. Like Lamina Guide Bushings they are ground to gauge-maker's precision. Made of water-hardening tool steel, they wear longer and eliminate "Mushrooming" when assembled in the shees.



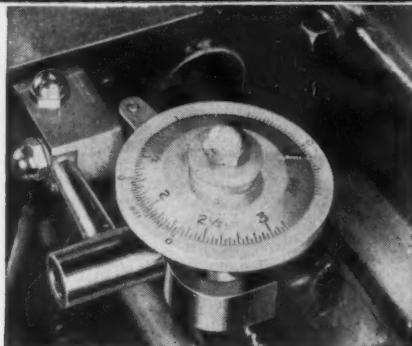
Lamina
DIES AND TOOLS, INC.

P.O. BOX 31 • ROYAL OAK, MICHIGAN

erates the Neo Engineering Co., Bridgeport, designers and builders of special tools and equipment.

The board of directors of Barnaby also elected Jack Stock as treasurer, Louis F. Kutscher as sales manager and Harold Saunders as superintendent. Barnaby manufactures a line of toolholders, knurling tools, floating holders, hinged shoe bushings, rotary stock stops, plastic molds and dies and special equipment.

YESTERDAY'S PIONEER . . . TODAY'S LEADER



WELDON . . . MEASURING ATTACHMENT

(*Direct Reading*) **Saves Time • Reduces Waste**

- This handy Weldon attachment measures directly the forward or reverse movement of the lathe carriage, within .001 of an inch. Easily attached to most lathes by drilling and tapping of one hole. • Dependable, accurate, convenient—saves time and reduces work spoilage.

WRITE FOR CIRCULAR LA-1

*Weldon distributors throughout U. S. A. and
Canada carry complete stocks to serve you.*

THE WELDON TOOL COMPANY



3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

Lees-Bradner Forms New Cri-Dan Division

The Lees-Bradner Co., Cleveland, Ohio, manufacturer of hobbing and threading machines, has announced the formation of a new division of the company to market and service its line of Cri-Dan high-speed threading machines. John A. Bradner, president of the company, stated that the formation of the new division became necessary because of the large increase

in sales of Cri-Dan machines over the past few years. The new unit is to be known as The



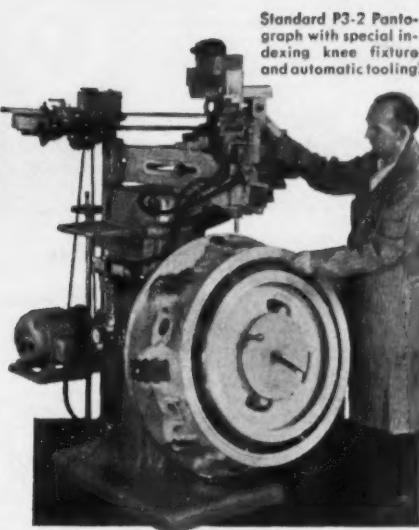
Fletcher Gleason

Cri-Dan Division of The Lees-Bradner Company and will be headed by Fletcher Gleason, formerly chief processing engineer of the company. The new division will have its own separate staff of sales, service and engineering personnel for matters pertaining to Cri-Dan machines.

This is
GORTON
Pantography

Ready to Help You

Photo shows a standard P3-2 profiling ports in an aircraft part, a large aluminum-alloy casting. The sides of each port are parallel; one end has a true radius, the other end is parabolic. A combination of other methods would do the cutting in hours, but the P3-2, with an automatic cutting cycle, finishes each port in 2.3 minutes.



Improve Production and Lower Costs

Gorton tracer-controlled equipment does efficient profiling, routing, die sinking, mold cutting, counterboring, chamfering, grooving, graduating, engraving and many other standard or special operations. You can expect high accuracy and high surface finish, whether your work involves metals or plastics in flat, uniformly curved, cylindrical or irregular shapes.

Enlarged templates, masters or patterns, all quickly and easily made, give Gorton Pantographs advantages of increased accuracy through reduction ratios. Work pieces range in size from the diameter of a dime to 10 feet. Cutting cycle is accomplished manually or automatically.

Fill out and mail the coupon for your copies of the Gorton catalog and the informative booklet, "Pantography."



1711 Racine St., Racine, Wis., U.S.A.

Please send at once complete information about the Gorton line contained in Bulletin 1655-1711.

Firm.....

Name.....

Title.....

Address.....

City, State.....

A 7786-1P-A



Newage (Canada) Ltd.,
Toronto, Ontario,
Canada

Newage Opens New Factory in Toronto

Newage International, Inc., New York 17, N. Y., has announced the

opening of a new factory in Toronto, Ontario, Canada, designated as Newage (Canada) Limited. Three main sales and service divisions have been set up. The first division is in the

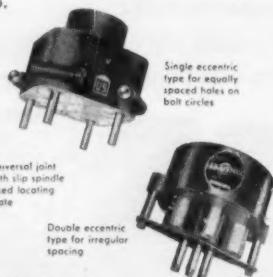
machine tool field where various highly specialized items, such as the Newage Portable Metal Hardness Tester, Newage Turbine Air Grinders and the Newage Universal Rindis Machine Tool, are handled. The second division covers the electrical, pump and engine field, and the third division deals with material handling, which will merchandise the "Stacatruc" products of the Austin Crompton Parkinson Group from England. The vital points being stressed in the three divisions are specialization in each field, immediate delivery from Canadian stocks and full service for the items being merchandised.

We're Looking for Head Hunters!



Most machine tool men have long relied upon the "US" Adjustable Multiple Spindle Drill Heads. But we are looking for those who still haven't tried them . . . and who are looking for the best. With their quick-change universal joint assemblies, they are built for continuous use, with full anti-friction bearing construction for high capacity thrust loads. The universal joint adjustable multiple spindle type is suitable for any sensitive drilling machine. Joints are self-lubricating. All gears are hardened and shaved with spindles superfinished. The single eccentric type is used for equally spaced holes on bolt circles.

The new double eccentric AdjUStatix, two to eight spindles, permits spindles to be located in non-symmetrical patterns. It eliminates expensive change in set-up.



Write for details on any type of universal joint adjustable head. Ask also about our totally enclosed gear-driven adjustable, fixed center, or individual lead screw tapping heads.

UNITED STATES DRILL HEAD COMPANY

616-618 BURNS STREET • CINCINNATI 4, OHIO

VLIER Ready-Made Spring Plungers

Eliminate Costly,
Custom-Made Devices

Provide accurate,
pre-set
end pressures
for every need!

Why waste toolmaker's time machining make-shift devices to provide necessary spring loads? Standardizing on low-cost ready-made Vlier Spring Plungers speeds jig and fixture manufacture and insures accurate, uniform loading, resulting in more accurate machining, fewer rejected parts!

40 TYPES AND SIZES! Hundreds of thousands of Vlier Spring Plungers are now in use positioning parts in dies, jigs, and fixtures, as detents, locating pins, and die ejection... wherever accurately-controlled, constant spring pressure is needed! Order a wide assortment of types and sizes from your Vlier distributor today!



- ① **Plunger end telescopes completely within body!** End pressure is determined with plunger end telescoped 50%.
- ② **Case-hardened plunger end gives high wear resistance!** Ductile core overcomes brittleness; reduces hazard of failure under impact common with hardened, high-carbon steel.



- ③ **Large bearing surface assures perfect alignment at any part of plunger travel; eliminates binding and reduces wear!**
- ④ **Rust-proof finish prevents freezing in the fixture!**

4 Nose Types Available!



Standard Nose — Cylindrical plunger end is accurately radiused to speed loading and unloading of jig or fixture. End pressures available from 3# to 42#; various diameters and lengths.



Silvernose — Cadmium-plated plunger ends identify light (1# to 7#) end pressures. Special spring design developed for fast, repetitive operations; give millions of flexes without fatigue failure!



Hexnose — Plunger end is hexagonal shaped. Can be easily and quickly installed, adjusted, or removed with an ordinary end wrench! End pressures available from 8# to 12# in Standard type, and from 2½# to 6# in Silvernose type; various diameters and lengths.



Plastic Nose — For use with aluminum, brass, and other soft, easily marred materials. Plastic plunger end reinforced for less deformation under loading. Excellent wear resistance; high dielectric strength. End pressures available from 5# to 18# in Standard type, and 1½# to 7# in Silvernose type; various diameters and lengths.



VLIER

ENGINEERING
INCORPORATED

4552 BEVERLY BOULEVARD
LOS ANGELES 4, CALIFORNIA



Vlier Screw-ball Clamps — Overcome angular irregularities in clamping set-ups. Prevent surface damage. 17 sizes!



Vlier Key Klips — Eliminate lost hex keys! Speed positioning of part in fixture. 3 sizes!



Vlier Torque Thumb Screws — Apply accurate, controlled end pressures to the workpiece. 4 models: 19 sizes!



Vlier Spring Stops — For use where there are no wall sections in fixture. Two models: 14 and 32 lbs. end pressure.



Vlier Toggle Pads — Assure clamping of parts with irregular surfaces. 5 sizes: for use with standard screws, toggle clamps and pliers.



Vlier Fixture Keys — New 5-Way Key fits all common millable slots. 3-Way model also available.

Write for your complete catalog of Vlier PRODUCTS today! It's free!

**John Bertram & Sons Named to
Manufacture "Mor-Speed"
Equipment in Canada**

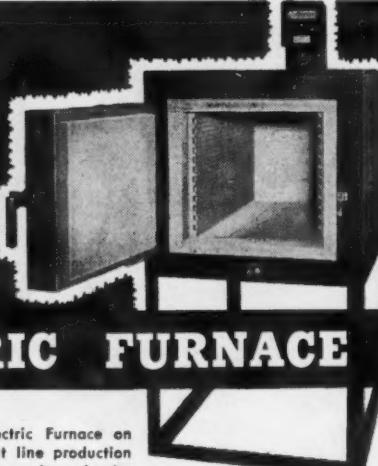
In a move designed to increase and speed the supply of high production machinery for Canadian industry, The John Bertram & Sons Company, Ltd., has been named to manufacture "Mor-Speed" special production equipment in Canada. Design and engineering work on the special machines will

continue to be done by the Morris Machine Tool Co., Cincinnati, Ohio. Founded in 1861, the Bertram firm now employs close to 650 people. Its plant, located in Dundas, Ontario, comprises approximately 320,000 sq. ft. and is believed to be the largest machine tool manufacturing plant in Canada, both in size and variety and capacity of machine tools produced. Bertram manufactures more than 75

different types of units for heavy industrial, railway and structural uses. A separate metal cutting tool division produces more than 20,000 different types of cutting tools, gages and special small tools.

The Morris Machine Tool Company is well-known in mass production industries in the United States, having built many special machines for various fields. Distribution of the new line of production equipment will be handled through Bertram's sales division, Acme-Bertram Machine Tools Ltd., with offices in Toronto, Hamilton, Montreal, Windsor, Winnipeg and Vancouver. Morris field engineers will

**SAVE
3
WAYS
WITH A
LUCIFER
ELECTRIC FURNACE**



1 **SAVE** with a Lucifer Electric Furnace on **FIRST COST**. Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces . . . feature by feature . . . you'll save money on the Lucifer Electric Furnace **EVERY TIME**.

2 **SAVE ON MAN HOURS** with a Lucifer Electric Furnace. Less operator attention needed—Lucifer controls are **EXACT**. They reach **SPECIFIED** heat rapidly and retain **SPECIFIED** temperature without variation. No special experience required when you use a Lucifer Furnace.

3 **SAVE** on maintenance expense with a Lucifer Electric Furnace. Finest refractory materials are built into Lucifer Furnaces for better, more efficient heat retention. Elements are guaranteed, long lived, trouble free. More than two thousand satisfied users.

CHECK THESE PRICES

Furnace Size	2000'	2300'
6x 6x12"	\$467.00	\$548.00
9x 9x18"	647.50	764.00
12x12x24"	912.00	1068.90
18x18x36"	1419.75	1629.50

Complete with 100% automatic electronic controls.

WRITE FOR FREE LITERATURE, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering advice without obligation. Write, wire or 'phone today.

LUCIFER FURNACES, INC.

Successors to Gilbert S. Simonski Company
Neshaminy 10, Pa. Phone Osborne 5-0411

NOPAK Shelf-Stock Service – based on these 2 Standard Mounting, Class 1, Cushioned Cylinders



MODEL A

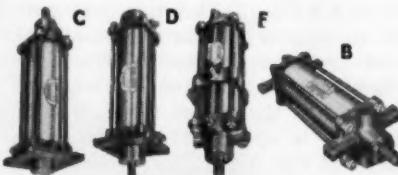
MODEL E



Now
in its 6th
year

LIST PRICES F.O.B. Milwaukee, Wisconsin (Subject to Revision)

Cyl. Dia. Bore	STOCK STROKE LENGTHS — All Double Acting									
	1"	2"	3"	4"	6"	8"	10"	12"	15"	
1½"	24.16	25.72	26.08	26.44	27.16	27.68	28.60	29.32	30.40	
2"	26.24	27.68	28.32	28.76	29.64	30.52	31.40	32.28	33.60	
2½"	32.36	34.12	34.68	35.24	36.36	37.48	38.60	39.72	41.40	
3"	35.04	37.28	37.92	38.56	39.84	41.12	42.40	43.68	45.40	
4"	40.84	43.68	44.52	45.36	47.04	48.72	50.40	52.08	54.60	
4½"	48.96	51.92	52.88	53.84	55.76	57.68	59.60	61.52	64.40	
6"	66.60	70.80	72.20	73.60	76.40	79.20	82.00	84.80	89.00	
8"	126.80	129.20	131.60	134.40	141.20	146.00	150.80	158.00		



Representatives in Principal Cities

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

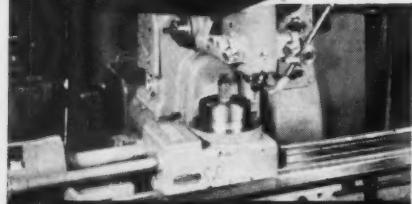
GALLAND-HENNING NOPAK
2758 South 31st Street, Milwaukee 46, Wisconsin

TEAR OUT THIS AD
for Reference — or
write for extra
copies.



A 8003-1/2-IAR

How To Increase Production And Improve Accuracy



With a SUNDSTRAND Automatic Index Base

In many cases, the addition of this Automatic Index Base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this service.

**Accurate
Spacing,
Powerful
Clamping
Insures
Accuracy**



Sundstrand
Automatic Index Base

This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

Get Complete Data Free

This 8 page booklet contains production figures and specifications. Send for your copy today. Ask for bulletin 550.



SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

be available to Canadian manufacturers for consultation on production problems at all times.

National Fluid Power Association Holds Fall Meeting

The National Fluid Power Association held its 1954 Fall Meeting recently at the Hotel Commodore, New York City. Ninety-two representatives from the 64 member companies and guests heard reports from committees on markets, education, government relations, design standards, ratings, terminology and fluids and symbols. Subsequent discussions on these subjects were held. The 1955 Spring (Annual) Meeting of the Association will be held in Colorado Springs, Colorado, on April 5, 6 and 7, and the 1955 Fall Meeting will take place in Chicago on November 2, 3 and 4. B. N. Ashton, president of Electrol Incorporated, is president of the Association. Association headquarters are located at 1618 Orrington Ave., Evanston, Illinois.

Ninth Midwest Quality Control Conference

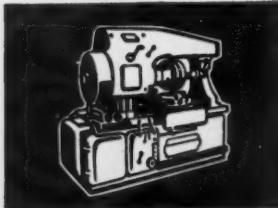
Several hundred members of the American Society for Quality Control, together with members of the nation's industry who are interested in the science of quality control, will gather in Dallas, Texas, on November 18th and 19th for the annual Ninth Midwest Quality Control Conference to be held in the Baker Hotel. The conference is sponsored by the 19 sections of the A.S.Q.C., representing all types of industry from about 12 central and southern states, in conjunction with the Dallas and Fort Worth Chambers of Commerce and Southern Methodist University. The remaining 51 sections of the society, located throughout the U. S., hold similar conferences each year, in addition to the Annual Convention.



NEW
Allen leader point cap screws

Dropping, knocking against metal surfaces and faulty line-up are major causes of damaged threads. Allen's new unthreaded leader point substantially reduces the causes of screw thread injury, or damage to threaded holes. Grip Heads, precision fit sockets that adhere to the key, *plus* the new leader points, make Allens the world's easiest starting cap screws, particularly in inaccessible spots. Sold *only* thru leading Industrial Distributors.

ALLEN
MANUFACTURING COMPANY
Hartford 2, Connecticut U.S.A.



FACTORY PROVED MACHINE POWER CONTROL

ROCKFORD CLUTCHES and POWER TAKE-OFFS—with constantly improved design—have controlled power transmission satisfactorily in many types of machine tools during the past third of a century. Their smooth, reliable, trouble-free operation has caused them to be specified as original equipment for scores of different makes. It will pay you to investigate the competitive advantages that ROCKFORD CLUTCH exclusive features will give your machines.



Send for This Handy Bulletin
Shows typical installations of
ROCKFORD CLUTCHES
and **POWER TAKE-OFFS**. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.



ROCKFORD CLUTCH DIVISION
BORG-WARNER

300 Catherine Street, Rockford, Illinois

ROCKFORD CLUTCHES

JOHNSON BAND SAWS



SPECIFICATIONS MODEL B

Capacity—5" rounds, 10" flats.
Height Overall—(Closed)—32".
Blade Length—7'5" x $\frac{1}{2}$ " x 23 ga.
Floor Space—46" x 28".
Weight—(Uncrated) 235 lbs. Crated 280 lbs.
Boxed for Export 400 lbs.

Wheel Diameters—10".
Motor— $\frac{1}{3}$ H.P. any voltage available.
Speeds—45, 90 and 150 ft. per min.
Casters—Optional at slight extra cost.

MODEL J, 10" x 18" CAPACITY ALSO AVAILABLE

WRITE FOR DETAILS

JOHNSON MANUFACTURING CORP.
ALBION, MICHIGAN

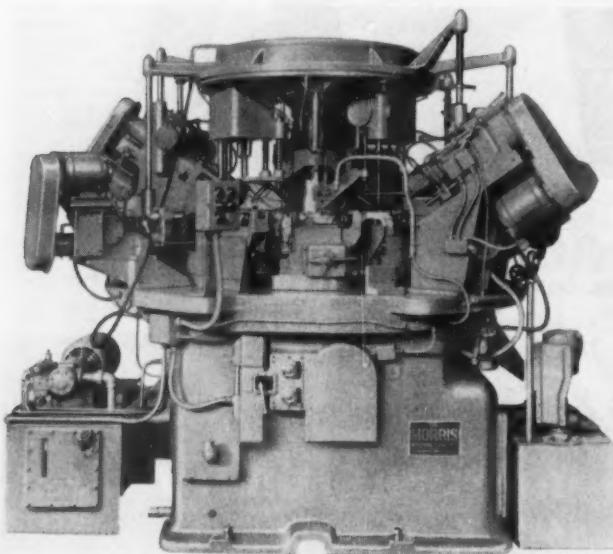
new shop equipment

Mass Production Machine Per- forms 23 Individual Operations

A mass production machine designed to perform 23 individual operations on a four barrel carburetor part and produce up to 375 pieces per hour has been announced by The Morris Machine Tool Co., 934 Harriet St., Cincinnati 3, Ohio.

According to the manufacturer, the

machine is an adaptation of its 67S design. A standard base, indexing table, center column, straight and angular drilling heads, cooling and hydraulic systems are all combined in the machine which is engineered to do a special job with a minimum of special tooling. In operation, the machine drills, reams, countersinks, taps and spot faces a variety of angular, vertical and horizontal holes in the carburetor air horn die casting. To perform these operations, there are six rack-fed auxiliary heads mounted on a platen or table that surrounds the indexing load table. The auxiliary heads perform horizontal and angular operations. The center column of the



Morris Mass Produc-
tion Machine

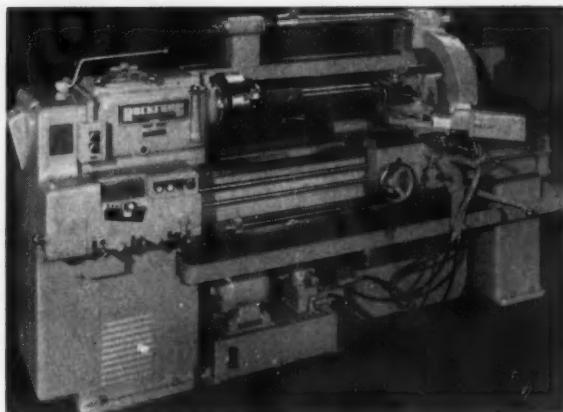
machine carries a mushroom head which is hydraulically actuated to feed the vertical spindles into the parts at the proper station. The operation of the mushroom head also actuates the rack-fed auxiliary heads.

The parts are carried on a table which indexes automatically to the six production stations. To present the necessary surfaces of the work-pieces to the various spindles, the parts are placed first in the "load cycle" fixture. Then, after completing a revolution of the indexing table the parts are placed in the "transfer cycle" fixture, being rotated 180 degrees in the transfer operation. The load and transfer fixtures clamp with a single hand-operated clamp. An automatic safety switch checks the clamping of the parts. If either is improperly clamped the table will not index. Automatic lubrication is provided for all moving parts.

Engine Lathe Is Tracer Controlled

The Rockford Machine Tool Co., Dept. Q, 2500 Kishwaukee St., Rockford, Ill., has announced a tracer-controlled engine lathe. The basic machine is an all geared head, 18 inch engine lathe having 12 spindle speeds, 32 feed changes and bed lengths from 6 to 12 feet. It is powered by a 5 h.p. motor and spindle speeds up to 1140 r.p.m. are available.

The tracer control is an adaptation of the company's "Kopy Kat" duplicator. An entirely independent, sealed



pumping unit, featuring a governor controlled pump, is mounted directly under the chip pan and requires a minimum amount of floor space. The tracer valve is mounted on an overarm at convenient operator height. All hydraulic lines from the valve pass through the overarm and along the apron, clear of chips, coolant and work or operator interference at all times. The system operates at a maximum unit pressure of 400 p.s.i. and is said to develop a total holding force of 1,650 pounds.

The template carrier is mounted high enough for maximum operator visibility. Safety is increased inasmuch as there is no necessity to reach over rapidly revolving work or chuck. The template carrier is furnished for round masters which may be produced on the machine. A flat master attachment is available as extra equipment. The tool slide is positioned on a 45-degree angle and is said to permit a maximum diameter change up to 6 in. with a maximum work swing of 10½ in. over the carriage. A rigidly mounted, four-position tool post is furnished as a standard part of the tool slide. Convenient 90-degree infeed control is possible by means of a vertically mounted, double, ball crank.



Landis Improved No. 12 Centerless Grinder

Improved Machine Grinds Work Up to 4 $\frac{3}{4}$ Inches in Diameter

Landis Tool Co., Waynesboro, Pa., has announced an improved No. 12 Centerless Grinder which is said to be capable of grinding workpieces up to 3 $\frac{1}{2}$ in. in diameter using standard work rests. Heavy-duty work rests increase the work capacity to 4 $\frac{3}{4}$ in. diameter. Grinding wheels are 20 in. in diameter and up to 8 in. wide. Regulating wheels are 12 in. in diameter and up to 8 in. wide. A 15-h.p. motor drives the grinding wheel. According to the manufacturer, the machine can be used for either infeed or throughfeed grinding of parts which may be more economically finished by centerless grinding than by center-type grinding. The machine can be used for either heavy stock removal or unusually close tolerance work of straight or profiled shape. Features have been built into the machine to permit rapid change of setup, making small lot production both practical and economical.

Among the major improvements in the No. 12 is the addition of pressure lubrication to the spindle bearings of the grinding wheel head. The bearings are flood lubricated with filtered oil

from a separate reservoir. This system has its own pump and safety pressure switch. Pressure must be built up in the circuit before the wheel drive motor will start. If pressure should fail, the drive motor will stop. Also available on the improved machine is hydraulic rapid infeed and slow grinding feed, especially desirable for high production infeed grinding operations. The rapid infeed stroke is $\frac{1}{4}$ in. and the continuous slow grinding feed is adjustable from zero to 0.100 in. on diameter. Rate of feed is also adjustable. A hand-operated dresser for the regulating wheel is mounted on the wheel head above the regulating wheel. Adjustments are provided for dressing the wheel correctly in relation to the angle of tilt and the height of the workpiece above the wheel centerline. The work rest is mounted directly on the bed casting between the grinding wheel head and regulating wheel head. Both heads slide on ways and are positioned by handwheel feeds. Also included in the improved machine is a variable speed regulating wheel, with r.p.m. varied by rheostat control.

Straight-Side Double-Crank Press Features Fully-Enclosed Construction

Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y., has introduced the Series SC-2 Straight-Side Double-Crank Press which features a design improvement that completely conceals the driving mechanism. There is no overhanging flywheel, clutch, brake, intermediate

SHELDON

CHICAGO

U. S. A.



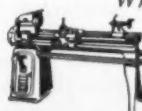
More will be profit
with a **SHELDON**

It actually costs less to do most turning jobs on a Sheldon Precision Lathe. Machine-tool investment is cut to a fraction. Power cost is materially reduced. Less experienced operators can operate Sheldons safely and efficiently. Even cost-loadings for plant—floor space, heat and light are lower because two Sheldons can often operate in the space occupied by one large lathe.

On most "everyday" jobs a Sheldon will actually turn out more

pieces per hour too. With double V-belts to the spindle Sheldon lathes deliver enough power to take a healthy bite in direct drive, at really high speeds. Sheldon's "Zero Precision" Taper Roller Bearings permit work to the closest tolerances. Very seldom if ever are such extremely accurate bearings used in other lathes.

You will actually keep more as profit if you use Sheldon Lathes wherever possible.



Write for Catalog

SHELDON MACHINE CO., Inc. 4250 North Knox Ave., Chicago 41, Illinois

TWENTIETH CENTURY
MANUFACTURING CO.



Uneeda
LIGHT

DIRECTS A BEAM OF WHITE LIGHT
ON YOUR CLOSE PRECISION WORK

▼ Tool and Die Makers claim it for utility, getting into nooks or crevices hard to reach with ordinary light—for lining up punches in dies or working with the scribe in close places. Completely adjustable and portable. Light does not reflect back to your face. Ideal for inspectors seeking burrs, flaws, etc.



Price complete with
2 size bulbs \$13.75

WRITE FOR
THIS CATALOG
No. 30

GARBERDING & FINGER STOPS

▼ STOP-PINS are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch. No threads inside STOPS for springs to catch on.



STOP-PINS (5 Sizes)

▼ GARBERDING FINGER STOPS made in uniform width to fit any standard width slots. Just grind ends to fit. Write for Literature.

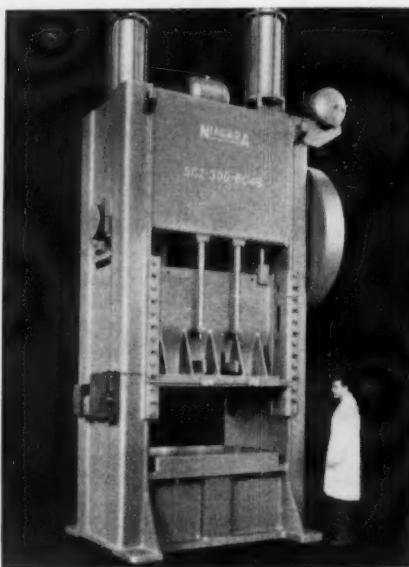


FINGER STOPS (3 Sizes)

TWENTIETH CENTURY
MANUFACTURING CO.
ROUTE 176 and BRADLEY ROAD
BOX 429M, LIBERTYVILLE, ILL.



shaft, nor motor in the rear of the press to obstruct crane service, block light, throw grease and consume floor space unnecessarily. To assure accuracy and long die life, all-steel rigidly-constructed one and four-piece frames, featuring an exclusive triple box section design, provide maximum resistance to deflection from horizontal, diagonal and torsional stresses. Box-type welded steel slides are power



Niagara Series SC-2 Straight-Side Double-Crank Press

adjusted through self-locking worm-driven barrel-type connections to accommodate a wide range of die heights and to permit quick, easy and safe die setting. Unusually liberal shut height and long slide adjustment are said to permit the use of an extensive range of stamping and forming dies.

An electric clutch control provides push-button operation, and a five-position selector switch can be readily locked at proper location for single stroking, continuous running, jogging,

sub-ZERO treatment

... Eliminates
Distortion
... Cuts Grinding
Cost
... Increases
Production
... Boosts Tool Life



at WATERBURY TOOL DIVISION
OF VICKERS INCORPORATED
WATERBURY, CONN.

Used in conjunction with a conventional carburizing-heat treatment cycle, Sub-Zero treatment at this noted manufacturing plant showed three-fold advantages. Formerly, in the production of precision parts, distortion showed up after finish grinding, necessitating several grinding operations. Now, Sub-Zero has eliminated the cause of distortion . . . a single grinding operation is all that is required and

production has increased. In another department, purchased tools are routinely Sub-Zero treated to increase service life. A certain tap, for example, formerly was good for 5 to 20 holes; now it produces up to 250 holes . . . over 1000% added life! A new catalog gives complete technical data on Sub-Zero metal treatment . . . shows how you, too, can save. Write for your copy today!

Cincinnati Sub-Zero Products
3930-54 Reading Road Cincinnati 29, Ohio

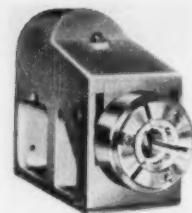
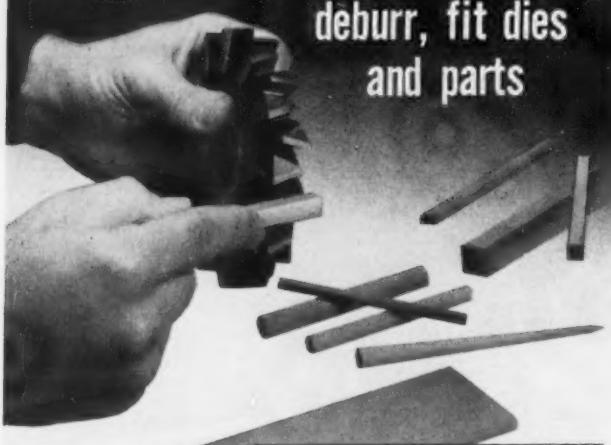
reverse jogging and slide adjustment. Available in capacities ranging from 50 to 300 tons, the press can be equipped optionally with automatic lubrication, pneumatic die cushions, automatic feeds, variable speed drives, knockout bars and automation.

Air Collet Chuck Mounts on Indexing Tables

An air collet chuck specifically designed to mount horizontally or verti-

cally on indexing tables to speed up production operations on castings and screw machine parts has been announced by Pitt Industries, Dept. MMS, Carnegie, Pa. The chuck is said to be capable of accommodating castings of wide variations in size and shape, registering the parts in the exact position each time. According to the manufacturer, the design of the unit permits the handling of castings where tolerances are required for variations as much as $\frac{1}{16}$ in., thereby eliminating unnecessary grinding. The air chuck can also be mounted on drill presses and mill-

To help skilled hands sharpen tools,
deburr, fit dies
and parts



Pitt Air Collet Chuck

**NORTON® INDIA® and
HARD ARKANSAS® Files**

are preferred by master mechanics, tool and die makers because they provide the final touch of smooth precision, and are available in every form needed to reach the most difficult and critical spots in intricate work. For full data write for Catalog No. 54, to Behr-Manning, Troy, N. Y., Dept. MS-11.

* Trade-mark



0-6

- ▲ CRAFTS ABRASIVES
- ▲ SHARPENING STONES
- ▲ PRESSURE SENSITIVG TAPE

ing machines and is supplied with one master collet and one set of soft pads, or one solid collet for round or hexagonal parts. Collets or pads for special shaped parts can also be supplied. Air control valves for hand or foot operation are available as accessory items. Weighing 35 lb., the chuck has a capacity of from $\frac{3}{8}$ to $1\frac{1}{8}$ inches.

ATRAX

IN ACTION



**\$3,000 SAVINGS IN
LABOR WITH \$100
WORTH OF CARBIDE BURS**

A CASE HISTORY: One of our customers had an extremely difficult problem of burring some piece parts after assembly. After consultation with Atrax engineers, it was determined that Solid Carbide Burs were the only type that could be used to salvage this huge job. Six Carbide Burs were bought for this job, totalling approximately \$100.00. They saved the company over \$3,000.00 in labor. Besides this, they made possible salvage of very valuable piece parts for a very nominal original investment.

Possibly our engineers or sales representatives can help YOU achieve similar savings. You'll find them in all principal cities, ready to consult without any obligation.

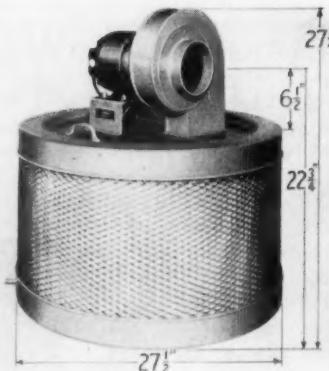


NEW! Complete 88-page Manual and Catalog of Carbide Tools. Write for your free copy.

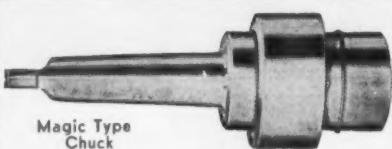
THE **ATRAX** COMPANY NEWINGTON, CONNECTICUT

Vapor Collector Is Redesigned for Wider Range of Uses

Increased suction plus a self-clearing paddle wheel type fan that can handle solids from wet machining operations are features of recent changes made in one of its vapor collectors by Aget-Detroit Co., 207 Main St., Ann Arbor, Mich. The model VCS-2 is now equipped with a paddle wheel self-clearing fan which not only increases the amount of suction at the



Aget-Detroit Redesigned "Dustkop" Model VCS-2 Vapor Collector



THE COLLIS MAGIC-TYPE CHUCKS

Reduce production costs with Collis Magic Chucks. Now tools can be changed without stopping or slowing down the spindle. Boring, counter boring, drilling, reaming, tapping, etc., can be performed practically continuously.

Let our 40 years of manufacturing experience help your customers select the proper equipment for the job.

"Call Collis For Service"

THE COLLIS CO.

Dept. A, Clinton, Iowa

source of the mist and spray but also will clear itself of solids that may be present. Centerless, thread and surface grinding with coolants normally have not produced anything to be collected other than mist; however, recent developments in grinding techniques generate solids which also must be collected.

New rating for the collector is 614 c.f.m. with 5-in. inlet which is developed by the paddle wheel fan being direct driven by 1/3-h.p. continuous duty motor. Mounting space required for the collector is 28 x 28 x 28 in. overall height. The collector is usually located overhead so that the condensate may return by gravity to the sump of the machine.

Buy safe "SHUR-GRIP"



drop forged HANDLES

Designed to hold 3 to 6 lb. lead hammer heads more firmly — will not slip — keeps hammer head in shape longer — makes re-molding easier, quicker, surer, less expensive.

Write for circular and prices

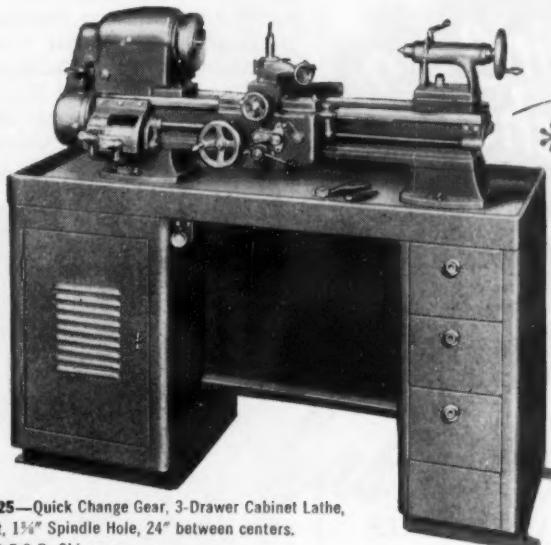
LAWRENCE H. COOK, INC.

67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.



The Answer

To your metal turning cost problem
may well be this 11" Logan Lathe *



No. 1925—Quick Change Gear, 3-Drawer Cabinet Lathe,
1" Collet, 1 1/4" Spindle Hole, 24" between centers.
\$875.00 F.O.B. Chicago.

* One of the
many in the
complete Logan
Line of 9", 10", 11"
and 12" swing
Lathes, and
8" Shapers.

The cost of precision results drops sharply when you turn work on this 11" swing Logan 1925. With 1" collet capacity, 1 1/8" bore, and 24" centers it takes pressure off costly-to-run, big lathes . . . with no difference in precision results.

Sustained accuracy and low cost performance are built into the 1925. The spindle revolves on preloaded ball bearings of extreme precision that need no adjustment for any speed from 45 to 1500 rpm. The rugged, balanced special alloy bed has two V-ways and two flat ways precision ground. The automatic apron, double-walled and friction-free, with spline-driven power cross feed, has a convenient, lever-operated, disc type clutch. The double V-belt drive transmits maximum power to the headstock. You will find the 1925 equally effective in production, shop and toolroom. Ask your Logan Lathe dealer for full facts.

- **Brief Facts**
- Collet Capacity, 1"
- Spindle Hole, 1 1/4"
- Swing over bed, 11 1/4"
- Center Distance, 24"
- Bed Width, 6 15/16"
- Ball Bearing Spindle
- 16 Spindle Speeds,
45 to 1500 rpm
- Double V-belt Drive
- Threads—48 selections,
RH or LH—
4 to 224 per inch

Write for the
Logan Lathe Catalog

Logan ENGINEERING CO.

Lawrence and Lamon Avenues, Chicago 30, Illinois

LOOK TO

FOR BETTER LATHES AND SHAPERS

Ordering Washers?

Take advantage of these
SUBSTANTIAL SAVINGS

by using Whitehead Stock
Washer Dies.

**1500 SPECIAL SIZE DIES
ON HAND.**

Whitehead makes washers and shims from any metal or special material to your specifications. Thickness from .002" to $\frac{3}{8}$ ".

In stock: S.A.E. standard light, medium, and heavy steel washers; brass and copper, small and large patterns; bolt sizes. Write for Whitehead's Catalog.

54-3



**WHITEHEAD
STAMPING CO.**

**1673 W. Lafayette Blvd.
Detroit 16, Michigan**

Oxy-Acetylene Outfit Features Double-Duty Blowpipe

Identified as the "Prest-O-Lite," a lightweight, fully portable oxy-acetylene outfit which features an "all-in-one" blowpipe with interchangeable welding and cutting tips has been introduced by Linde Air Products Co., a Division of Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y. The same blowpipe heats, bends, solders, brazes, welds and cuts. No special attachments are needed.



Linde "Prest-O-Lite" Welding and Cutting Outfit

As furnished, the outfit welds up to $\frac{1}{8}$ in. and cuts through $\frac{3}{8}$ in. of solid steel. Additional tips are available for welding up to $\frac{1}{2}$ in. and cutting up to 2 inches. The welding and cutting outfit comes complete, with full instructions. Besides the double-duty blowpipe, it includes one cutting and three welding tips, oxygen and acetylene pressure regulators, fitted double hose, a friction lighter, goggles and wrench.

The blowpipe is balanced to afford maneuverability and ease of operation. There are no bulky attachments to change the "feel" of the tool from

The responsibility

you

want?



THE *has it!*

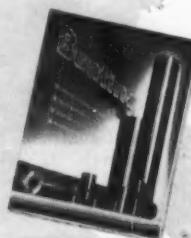
IT SAVES MONEY, time and trouble when you buy materials and component parts from a trustworthy source. Your industrial supplier who sells you Bunting Bronze Bearings and Bars carries in stock countless other products of comparable high quality.

YOUR BUNTING distributor is the leading industrial distributor, or a stock-carrying specialist in certain industrial items. With money-saving convenience, he can supply hundreds of different sizes of completely machined and finished Bunting Standard Stock Industrial Bearings, Electric Motor Bearings and Precision Bronze Bars.

Bunting®

BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS

Ask him
for a Bunting
Catalog which gives
complete dimensional
and technical data.



The Bunting Brass & Bronze Company • Toledo 1, Ohio • Branches in Principal Cities • Distributors Everywhere

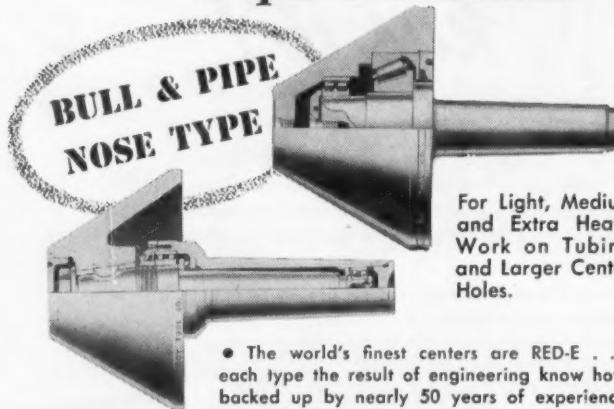
job to job. With any tip attached, the blowpipe weighs only 17 oz., and the overall length is about 13 inches. Rigid tube-within-a-tube construction and smooth flowing lines give the blowpipe a modern, streamlined appearance. Quickly interchangeable tips enable switching from welding or brazing to cutting work in a matter of seconds. Oxygen and acetylene pressure regulators weigh only 2 lb. each.

Improved Unit Facilitates Machining and Checking of Radial and Angular Operations

Machine Products Corp., 6771 E. McNichols Rd., Dept. D, Detroit 12, Mich., has announced many new features and improvements in the production of the Rotab, a device that is calibrated for movement in all planes, to facilitate the numerous machining and the checking of radial and angular operations. One of the

new features of the unit is an optical micrometer microscope with glass vernier reticle which permits direct reading to 5 seconds of an arc on a special graduated ring with clockwise and counter-clockwise markings from 0 to 360 degrees. The ring, which is located directly under the rotating table and which is rotated to the desired degree setting and clamped in position to become a fixed part of the table, is individually processed with optical precision to avoid accumulative error in degree markings. The center spindle, mounted on pre-loaded precision bearings, extends beyond the back plate and provides a conveni-

only RED-E *Anti-Friction CENTERS* are Superaccurate!



For Light, Medium
and Extra Heavy
Work on Tubing
and Larger Center
Holes.

• The world's finest centers are RED-E . . . each type the result of engineering know how, backed up by nearly 50 years of experience. The "Shank" and the "Ball & Roller" Type centers illustrated are just a few of over 200 exclusively designed centers available.

Ask for Catalog "B" (Pipe and Bull Nose Centers), "C" (Anti-Friction Centers), "D" (High Speed—Carbide Tipped Centers).

CENTER Specialists Since 1908

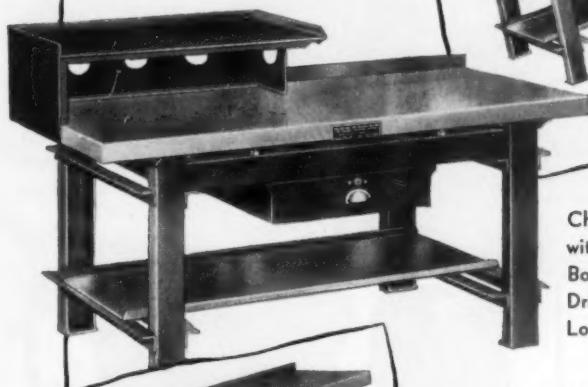


READY TOOL COMPANY
540 Iranistan Ave. • Bridgeport 5, Conn.

It's CHALLENGE CAST-IRON TOP WORK BENCHES for all-round shop efficiency!

3 Styles - 4 Sizes

All with durable 2-inch warp-proof, shrink-proof, fire-proof cast-iron top. All have leveling screws. All built to a high standard of Quality.

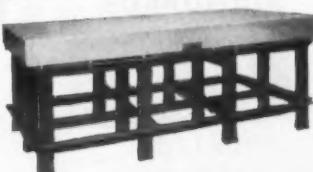


Challenge Work Bench
with Cast-Iron Top, Tool
Box Shelf and a Steel
Drawer with Pilfer-Proof
Lock.



TOP SIZES

4 Legs	6 Legs
28x48x2	28x72x2
28x60x2	28x84x2



LAYOUT SURFACE PLATE for layout, inspection or assembly lines. Available either precision ground or planer finished. Sizes from 12x18" to 54x14".



TRADE-MARK ®

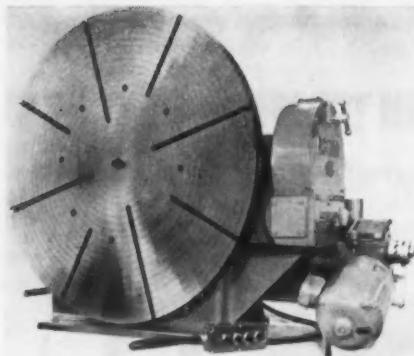
THE CHALLENGE MACHINERY CO.

Office, Factories and Show Room:
Grand Haven, Mich.

DEALERS IN ALL PRINCIPAL CITIES

Over 50 Years in Service
of the Graphic Arts

772



Machine Products Improved Rotab

ent and accurate point to attach a sine bar when the face plate is in a vertical position for obtaining radial measurement from a shelf by Jo-block setting.

The larger and heavier components handled on the 36 and 48-in. diameter tables are usually mounted with the

table in the horizontal plane. Cranes, hoists, and so on, quickly spot the component to be fastened in place and the table is then tilted to the desired angle. To facilitate the tilting operation, a power drive mechanism can, within 15 seconds' time, move the table from horizontal to vertical plane or return with a smooth, continuous operation. The table can be brought to a stop accurately so that only minor adjustment for precise tilt angle can be made by hand to Jo-block setting. The Rotab is available in four sizes with either a 12, 24, 36 or 48-in. diameter face plate, with motor drive for rotation on the larger sizes, and power tilt on the 36 and 48-in. sizes. Motors are jog-button-controlled, with interlocked limit switches and safety devices to prevent starting while clamped. Lubrication is provided by a one-shot system with special concentration on the bearing faces.

ONLY ACME
OFFERS YOU
2
BUSHING
STANDARDS

ACME
Industrial Company

212 N. LAFLIN ST.
CHICAGO 7, ILL.

MAKERS OF HARDENED
AND GROUND PRECISION PARTS



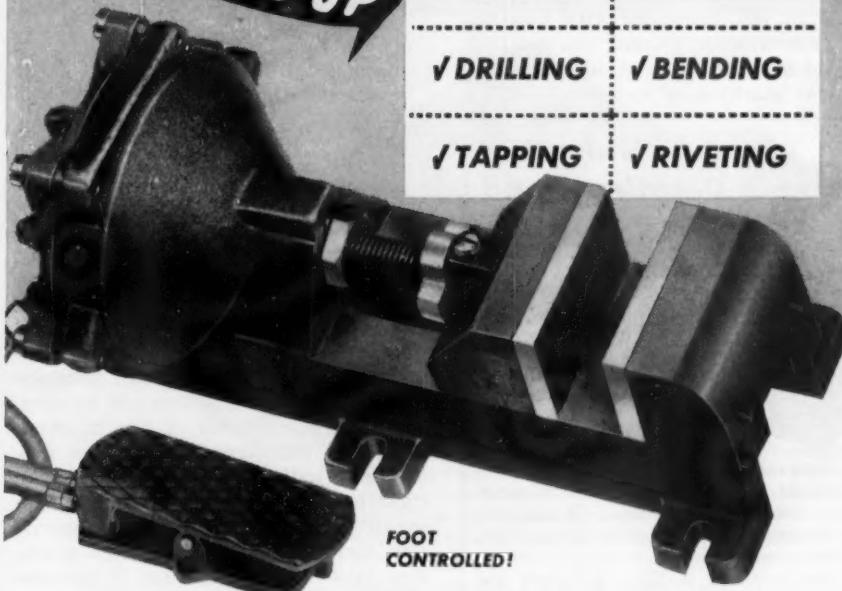
**TOTALING
16,984 SIZES**

Reduces "Specials" . . . Speeds Delivery . . . Cuts Costs

Only Acme offers two bushing standards giving you 9,870 EXTRA thin wall sizes...sizes now costing you premium prices elsewhere and delaying your production. Write for catalog.

SPEEDY AIR VISE

SPEEDS UP



✓ MILLING

✓ PUNCHING

✓ DRILLING

✓ BENDING

✓ TAPPING

✓ RIVETING

FOOT
CONTROLLED!

GRIPPING FORCE 15 TIMES AIR LINE PRESSURE

Speedy Air Vise helps you do dozens of operations faster, better, cheaper—by air pressure! Foot control valve opens and shuts vise instantly, leaving both hands free to produce more! Jaw opens up to 3 inches, holds castings, parts, jigs, etc. Compact, trouble-free, inexpensive.

Complete with Foot Control Valve, Air Hose and Fittings . . . only **\$36.00**

ORDER FROM YOUR MILL SUPPLY DEALER OR WRITE DIRECT



AIR REGULATOR

Precision-built. Delivers pressures up to 140 lbs. With gauge, \$5.95 Less gauge, \$3.25



AIR FILTER

Keeps water and particles out of the regulator and pneumatic tools. \$3.00



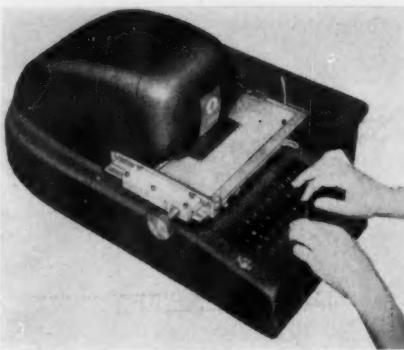
BLOW-GUN

Looks and operates like a gun. Ideal for cleaning and blowing out chips, dust, filings, scraps, etc. . . \$3.00

W. R. BROWN CORP. • 2649 N. NORMANDY AVE. • CHICAGO 39, ILL.

Improved Electric Typewriter Marks Metal Name Plates Quickly and Easily

An improved version of the Automark Electric Typewriter for marking metal name plates has been introduced by Defiance Machine & Tool Co., Inc., 1924 S. Vandeventer, St. Louis 10, Mo. Equipped with a standard typewriter keyboard, the machine is said to permit rapid, accurate, effortless marking of variable numbers



Defiance Improved Automark Electric
Typewriter in use



DIRECT INDEXING
Optional SWIVEL BASE converts a conventional dividing head into a universal work head or rotary table. Change-over is accomplished in seconds without tools or wrenches.

Also available in 10" - 12" sizes and in 10" - 12" spiral drive.

Write for Folder

CARROLL DIVIDING HEAD CO.

3525 Cordill Ave. • Cincinnati, Ohio

and letters. A light touch on the key produces a clean, sharp mark by instantaneous electrical response. There are no levers to pull or dials to spin, thus reducing operator fatigue. The machine, it is claimed, can produce as many as 75 characters per minute.

The improvements of the machine include a redesigned table feed mechanism with automatic shifting; a rigid heavy-duty table with precision control knob for accurate adjustment; line and margin spacer; high precision type wheels; increase in number of type faces available; and improved automatic stopping arrangement of marking wheel for maximum accuracy. The motor is 1/12 h.p.; however, a 1/8 h.p. motor can be provided for constant heavy-duty work.

*You Need an Extra Hand Now
to Speed Up Production!*

HEIMANN TRANSFER SCREW SETS

IN 11 SIZES—No. 6 to 1" N.C. in all S.A.E. sizes.

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per-hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

HEIMANN MFG. CO. • URBANA, OHIO

first
again with
the finest

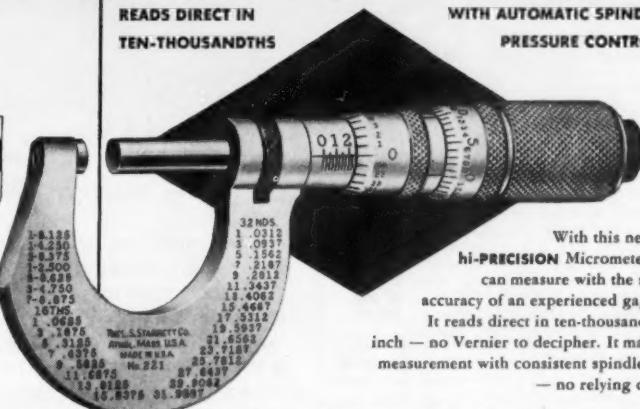
Starrett® announces

the NEW no. 221 hi-PRECISION MICROMETER

(PARENTAL)

**READS DIRECT IN
TEN-THOUSANDTHS**

WITH AUTOMATIC SPINDLE
PRESSURE CONTROL



With this new Starrett

hi-PRECISION Micrometer, anyone can measure with the speed and

accuracy of an experienced gage-maker. It reads direct in ten-thousandths of an inch — no Vernier to decipher. It makes every measurement with consistent spindle pressure.

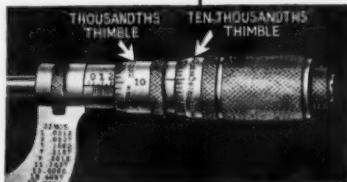
Starrett

No. 221
hi-PRECISION

OUTSIDE MICROMETER CALIPER
Range 0-1" by .0001"

The new No. 221 features the patented Starrett **HI-PRECISION** thimble with direct reading ten-thousandths graduations plus an exclusive constant-pressure mechanism which automatically insures exact spindle pressure on every measurement. Use it for faster measuring at top accuracy, for inspection and quality control applications and for all precision measuring requiring consistent, high precision.

The new Starrett No. 221 **hi-PRECISION** Micrometer is now available as a 0 to 1 inch outside caliper. Ask your industrial distributor to demonstrate its advantages and superior accuracy . . . or write for complete information. Address Dept. MD.



DIRECT TEN-THOUSANDTHS READINGS

The patented Starrett **hi-PRECISION** Micrometer features *dual thimbles*. The inner thimble with every thousandth numbered for positive identification is used to read thousandths in the conventional way. The outer thimble with large, widely spaced, numbered graduations gives direct readings in ten-thousandths.

Starrett®

"WORLD'S GREATEST TOOLMAKERS"



MECHANICS' HAND MEASURING
TOOLS AND PRECISION INSTRUMENTS - DIAL INDICATORS - STEEL TAPES
PRECISION GROUND FLAT STOCK - HACKSAWS, BAND SAWS and BAND KNIVES
THE L. E. STARRETT COMPANY, ATTOL, MASSACHUSETTS, U. S. A.

Indicator Depth Gage Utilizes Interchangeable Bars and Gage Pins

An indicator depth gage which utilizes a standard series of interchangeable bars and gage pins to provide a gage for practically any part condition is now being marketed by A. G. Davis Gage & Engineering Co., 21435 Dequindre Rd., Dept. B-8, Hazel Park, Michigan.

According to the manufacturer,

A Real Spring Winder!



Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the extension, compressible taper, or left in your shop. You'll reasonable.

HJORTH LATHE & TOOL CO.
10 BEACON STREET, WORCESTER, MASS.

HJORTH LATHE & TOOL CO.
10 BEACON STREET WOBURN, MASS.



Davis Model "V" Gauge Unit

er, the selection of the gages assures having a precision-built rugged gage for production use. All standard models have 0.200-in. adjustment and may be rapidly set to either gage blocks or a master set gage. Any of the popular makes of indicators can be furnished with the gage.

Dial Indicator Has Range of Two Full Inches

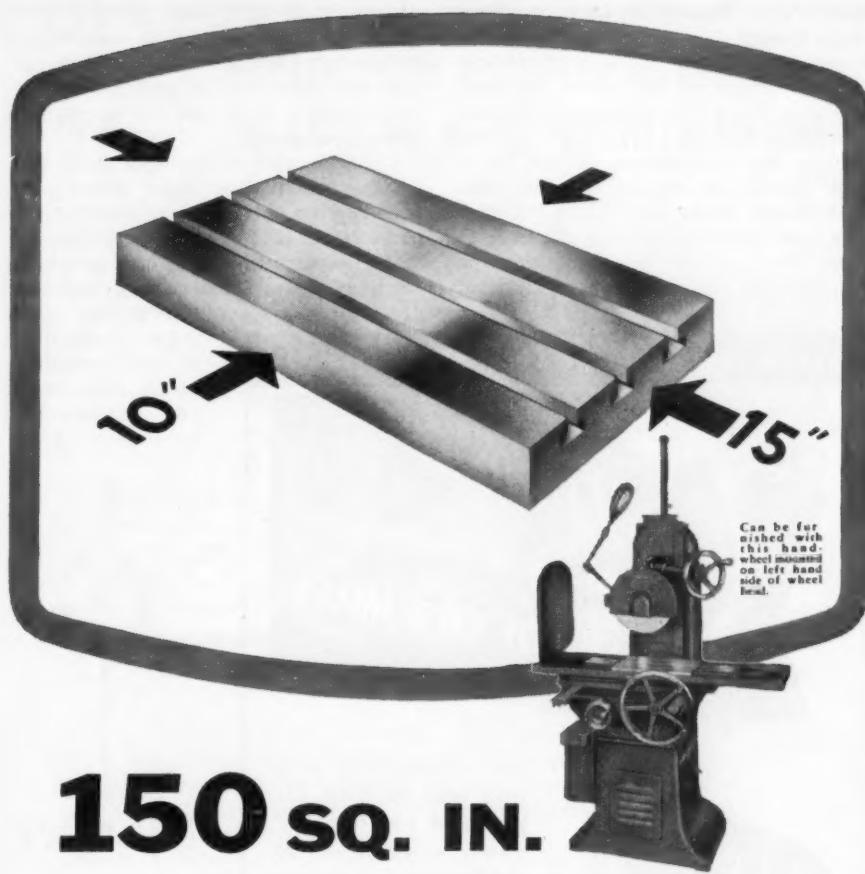
Designated as the Model D81T, a long-range dial indicator which is designed to measure two full inches in increments of 0.001 in. has been announced by Federal Products Corp., 4149 Eddy St., Providence 1, R. I. The instrument is furnished in the "D"



DRILL THESE HOLES

BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring its success.

WATTS BROS. TOOL WORKS



150 SQ. IN. OF WORK SURFACE

ABRASIVE NO. 1½ TOOLROOM SURFACE GRINDER—a quality-built hand feed grinder—has the capacity your toolmakers need for their work—nearly 50% more than most small surface grinders. Abrasive No. 1½ is easy to work with—it's a big favorite with toolmakers throughout the

world. Thousands of these simple, efficient grinders are in service today—in tool and die shops, and in the tool departments of production plants. Send for Catalog giving complete details. Abrasive Machine Tool Company 20 Dunellen Road, East Providence 14, R. I.

ABRASIVE

ACCURACY BOOTS PRODUCTION

Abrasive Quality is Reflected in the Finish of Your Product

size (2 1/4 in. diameter), and American Gage Design Committee specifications have been followed throughout, except for the length of the stem, the dust cap and rack. The indicator has two revolution counters. The first counter counts the revolutions of the large hand while the second counter tells how many times the first revolution has been around, enabling the user to keep track of the hands so that he can always tell which revolution of

each hand is being read. The pullback spring of the indicator is completely enclosed in the case. With an internal pullback spring, it is possible to use the indicator in either the horizontal or vertical position.

The indicator features dynamically balanced indicating hand which aids accuracy by cutting down inertia; no-glare bezel and case which make it easy to read the dial; and specially designed gears for accuracy and definite repeat readings. According to the manufacturer, full-jeweled movement minimizes fric-

ARROW TOOL & REAMER CO. • Established 1916

Arrow
means a complete
LINE OF END MILLS

THIS IS
Arrow's
3
FLUTE
END MILL

Manufacturing skill
and tool making ex-
perience for over 37
years — adds up to
preference for Arrow
End Mills.

Call your
Distributor or
write direct for
literature

ARROW TOOL & REAMER CO.
418-422 Livernois Ave. • Detroit 9, Michigan



Federal Model D81T
Long-Range Dial In-
dicator

tion and provides accuracy and sensitivity.

The regular Federal back with vertical central holding bracket is normally furnished, as is the regular contact point; however, a complete selection of backs and points are available.

A FULL CAPACITY TOOL & CUTTER GRINDER AT 2/3 to 1/2 THE COST OF A UNIVERSAL MACHINE

STERLING Model RK-2

22" Cutters on workhead

11" Cutters between centers

12" Grinding Wheel Travel



NEW DESIGN

Moving grinding wheel instead
of work makes easier set-ups,
easier operation.

Where you need added tool and cutter grinding capacity, or a strictly tool and cutter grinder the STERLING RK-2 will give you complete versatility plus extra capacity at a big saving.

Reversing the usual procedure of passing the work across the wheel eliminates the large table and produces a compact machine. Set-ups are easier because everything is in the open. Operation is easier because less weight is moved and better control is possible.

Greater capacity (up to 22" cutters on the workhead, 11" cutters between centers) and 12" wheel travel make the STERLING RK-2 a grinder that will handle a big variety of tools and cutters.

*Ask your dealer or mail coupon
TODAY for complete information.*

McDONOUGH
MANUFACTURING CO.

1521 Galloway • Eau Claire, Wisc.

McDONOUGH MFG. CO.

1521 Galloway, Eau Claire, Wisc.

Please send us complete details on the NEW
STERLING Model RK-2 Tool & Cutter Grinder.

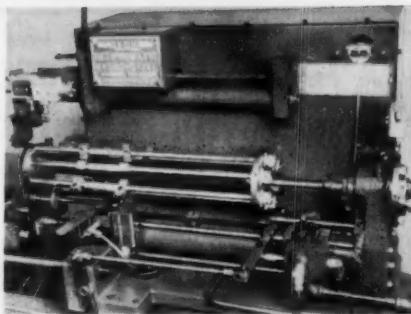
Name _____

Address _____

City. _____ State. _____

Turret Lathe Drive Automatically Clears Chips in Deep Hole Drilling

Lincoln Industries, Dept. MMS, 1121 S. 7th St., Minneapolis 4, Minn., has introduced the Lynn "Recipromatic" Hydraulic Drive, a drive for ram-type turret lathes with automatic reciprocating action to clear chips in deep hole drilling operations. The drive is said to provide an automatic cycle for withdrawing the deep hole drill from



Lynn "Recipromatic" Hydraulic Drive installed on ram-type turret lathe

GRANT RIVETERS

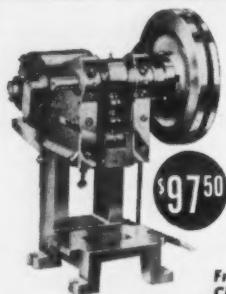


• Pioneers in the riveting field. Head rivets from smallest to $\frac{3}{4}$ " diameter, either by noiseless spinning or vibrating hammer method. — Sizes to meet all needs. — Types include Vertical and Horizontal Multiple Spindles. Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
96 Stillman Ave. Bridgeport 5, Conn.

the work to clear the chips. The drill then re-enters the hole at rapid traverse to the depth of the cut and continues to drill at normal feed until the chip clearing cycle is repeated.

The "recipromatic" action can be applied to any, or all, of the turret stations. Because chips are cleared automatically, at preset intervals, the manufacturer claims that deep holes are drilled quickly and accurately. All other turret stations are also driven by the hydraulic drive to make the complete machining cycle automatic. After making the setup, which is claimed to be so simple and accurate that it is efficient on short runs, the operator is required only to load and unload the machine. While the machining operation proceeds automatically, the operator can burr parts or load another machine.



CUT COSTS with ALLEN Punch Press

1-Ton Power Bench Type . . . Powerful, Dependable, Economical

For light work—stamping, forming, riveting—metal, fiber or other material.

Overall height $19\frac{3}{8}$ " . . . Base size $9" \times 8\frac{1}{4}"$. . . Die bed $6\frac{1}{4}" \times 8"$. . . Ram face $1\frac{1}{2}" \times 3\frac{1}{2}"$. . . Ram stroke $\frac{3}{4}"$. . . positive $\frac{3}{4}"$ ram adjustment . . . sturdy, single pin, non-repeat hand lever clutch . . . V-belt drive . . . weight 105 lbs.

The machine of a thousand uses! Adequate for many types of work now done on large presses at greater expense. Requires only $\frac{1}{3}$ HP motor.

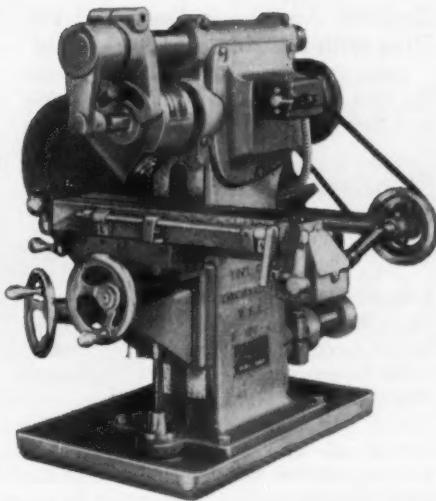
30-DAY MONEY-BACK GUARANTEE. Order TODAY. Price \$97.50
F.O.B., Clinton, Mo. (Includes Motor bracket, V-belt, motor pulley.)

Dealer Inquiry Invited

ALVA F. ALLEN, Dept. MM, CLINTON, MO.

BURKE BENCH MILLERS
... for most efficient
machining of small parts!

Here's the horizontal miller that combines unmatched accuracy and low cost! Two power feed tool room models and two hand feed production models permit rapid handling of a wide variety of small parts and freeing big millers for larger jobs. Numerous attachments and accessories provide even greater versatility and speed. Detailed literature on request.

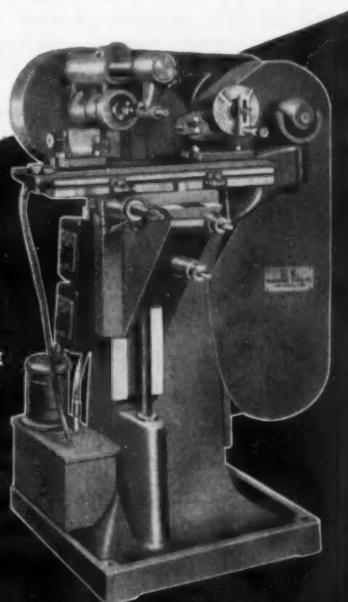


OUTSTANDING ACCURACY AT LOWEST COST

Find out how fast, accurate and economical small milling can be! U. S. Burke milling machines provide outstanding quality, dependability and convenience in operation . . . for hundreds of dollars less than leading competitors. Investigate U. S. Burke time and money-saving performance now! Write The U. S. Burke Machine Tool Division, 3 Brotherton Road, Cincinnati 27, Ohio

U. S. No. 1 HAND MILLING MACHINE
... half the cost, twice the value!

A top-quality precision production tool . . . priced so low it's actually profitable to spot it around "looking for work" that can be kept out of the milling section. Accurate, rigid, simple and adaptable. Easily equipped with air-hydraulic feeds for high production. Detailed literature on request.



THE **U • S • Burke** MACHINE TOOL DIVISION

Coolant Aerator Is Designed for Use with Soluble and Light Oils

Designated as "Mel-o-Flo" Model No. 600, a coolant aerator, for soluble and light oils, which connects to the



Melard "Mel-o-Flo" Model No. 600 Coolant Aerator

coolant line and mixes atmospheric air with coolant, resulting in a non-splash aerated mixture that is said to cling to the work and tools, has been announced by Melard Mfg. Corp., 432 Austin Place, New York 55, N. Y. The non-splash aerated coolant is said to keep operators and floors dry and has good wetting action. According to the manufacturer, no compressed air line or special plumbing is required to install the unit, and the aerated coolant leaves no vapors and reduces centrifugal throw-off. A simple, self-cleaning

mechanism, it is claimed, purges the aerator of chips and sludge whenever the coolant supply is interrupted. The "Mel-o-Flo" Coolant Aerator is designed for use on all manual or automatic machine tools for turning, milling, grinding, drilling, tapping, threading, broaching, hobbing and sawing.

Automatic Unit is Designed to Eliminate Tap Breakage

An automatic electro-pneumatic tapping unit for high-speed sensitive threading that is designed to eliminate tap breakage has been introduced by Smith & Wiese Co., 1265 W. Second St., Cleveland 13, Ohio. The unit incorporates an air motor with electro-pneumatic control which provides for momentary tap reversals at rates up to 200 cycles per minute. The tap chuck is driven through a triple spiral spring mechanism which is claimed to be super-sensitive in detecting resis-

IF you want to cut production costs --
THEN without machining, you can:

Accurately locate and secure drill bushings,
Center and secure shafts in Alnico rotors,
Anchor spindles in abrasive wheels,
Locate and secure fixture fittings in assembly frames,
Anchor bearings in machinery.

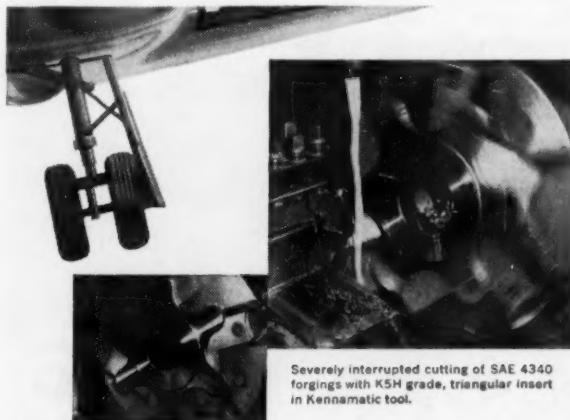
Bulletin A1 shows how Cerro Alloys can save time and money in above operations. Write for it today.



CERRO DE PASCO CORPORATION

Dept. 10, 40 Wall St., New York 5, N. Y.

K5H—a performance report on another Kennametal grade with ideas you can use to cut machining costs



Severely interrupted cutting of SAE 4340 forgings with K5H grade, triangular insert in Kennamatic tool.

K5H grade insert tools successfully face aircraft forgings heat treated to 220,000 psi tensile

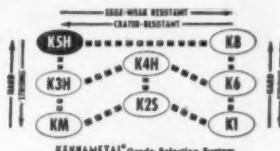
These tough, heat-treated SAE 4340 steel landing gear parts, heat treated to 220,000 psi tensile strength (Rockwell 47C), require severe jump cutting operations.

Using various grades of standard brazed tools, the Menasco Manufacturing Company rough and finish faced both sides at 87 RPM and .0035-inch feed. Even at this relatively low speed and feed, tool life was only two to four pieces per grind. Three cuts were necessary on each side of the forging. Approximately 6.35 minutes were required to change these tools—15 minutes to reground them.

With K5H inserts in Kennamatic* tools, these forgings are now faced at 150 percent greater speed and twice the previous feed. Only two cuts are required on each face. Rotating the insert to a new cutting edge takes 45 seconds. Since three cutting edges are available on each end of the triangular insert, both sides of 54 pieces are faced before regrounding is necessary. Both ends of the insert are reground in 10 minutes.

K5H is the hardest of the Kennametal* grades. It is highly resistant to cratering, abrasion, galling and pick-up and is available in solid tools and inserts for precision boring and fine finishing of steel at high speeds. K5H is very strong for such a hard material.

The Kennametal Grade Selection Guide (below) offers you a simplified method for pin-pointing the exact grade of carbide that will assure top tool performance on every machining job. It shows that K5H is the hardest, most crater-resistant of the Kennametal grades. If this grade is being used and cratering is no problem, a change to K8 will provide greater edge-wear resistance. Or, if additional strength is desirable, K3H will improve tool life.



KENNAMETAL* Grade Selection System

Tool breakage, chipping, excessive edge or top surface wear, heat checks and other causes of poor tool performance indicate a need for tool wear analysis. A Kennametal Tool Engineer is ready to help you with these problems... to help you select the best grade and tool for any job. In addition to his own broad experience, he has available to him the backgrounds of 150 other Kennametal Tool Engineers. He's as near as your telephone. Call him, or write to KENNAMETAL INCORPORATED, Latrobe, Pennsylvania.

*Registered Trademark

A25



INDUSTRY AND
KENNAMETAL
...Partners in Progress



tance to the cutting force. Any such resistance, whether due to chip loading or to the nature of the material being tapped, instantly puts into effect whatever rate of tap reverse-and-return is required for the work to proceed smoothly and accurately, never permitting application of excessive, tap-breaking force. Cutting torque is said to be controlled to the ounce by the unit, which accommodates taps ranging from No. 2 x 56 to $\frac{1}{16}$ inch. It

produces Class 3 threads in materials ranging in hardness up to Rockwell 50 C, the only limiting factor being the hardness of the tap itself. Hole depth, it is claimed, can be preset to within plus or minus 0.0035 in., and the unit works equally well in blind or through holes.

The machine, which operates on from 70 to 125 p.s.i. air supply, is fully automatic, and the complete tapping cycle is carried through at the press of a button or foot switch. Adjustments provided in the unit are permissible tap torque, amount

NEW! **heinrich**
Model "33" AIR VISE
FOR HIGH-SPEED PRODUCTION

Built-in recessed parallels
level work.

3"-wide vise jaw infinitely
adjustable to 3 $\frac{1}{2}$ " opening;
maximum travel, $\frac{3}{8}$ "

Hardened and ground par-
allel bars maintain perfect
cylinder to jaw alignment.

Sturdy diaphragm-type cylin-
der completely encased.

Foot treadle leaves operator's hands
free; vise jaws remain open or closed
without constant foot pressure.

Complete with
foot treadle,
fittings, hoses

Precision-made Heinrich Model "33" Air Vise is easier to set with simple, ratchet-operated, triple-lead thread adjusting screw. Grips with 15 times air line or compressor pressure! All operating parts protected from oil, dirt, chips, etc. Saves tooling costs; use it as base structure.

NEW CATALOG FREE!

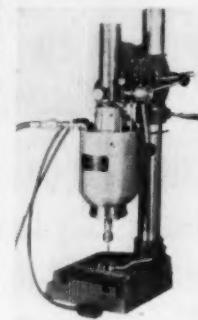
Be sure you have a complete Heinrich Tool Catalog in your files. Your copy will be sent free upon request.

DEPT. 114-L

Drill Press Vises • Fixture Locks • Nibblers
Punches • Rod Cutters



RACINE, WIS.

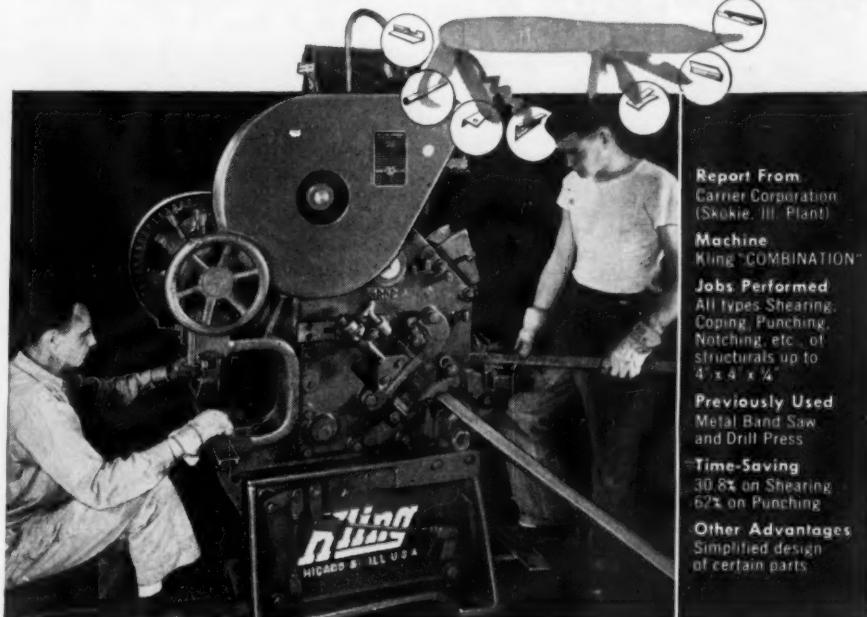


Smith & Wiese Auto-
matic Electro-Pneu-
matic Tapping Unit

of rotation reversal, depth of thread and liftout force. The unit is about 13 $\frac{1}{2}$ in. high with a maximum diameter of 6 $\frac{5}{8}$ inches. It is available as a separate unit for mounting in other machinery or mounted on bench or floor-type pedestal stands.

You, too, can

"WHITTLE DOWN" YOUR METAL PARTS' COSTS



438MMR

the **Kling** **COMBINATION SHEAR-PUNCH-COPER**

is the "jack-of-all-jobs" IN THE "BEST OF COMPANIES!"*

It's as all-round useful as your boyhood jackknife. For example at least eight different operations are performed by this Kling Combination Machine, in one of the plants of a nationally famous manufacturer of air-conditioning equipment, according to their report. In addition to time-savings of 30.8 to 62%, this "all-round" machine makes possible much simpler designing of important parts.

For maximum speed and safety, each end operates independently. Available in 3 sizes, for light, medium and heavy work. Ruggedly built for dependable performance over many years of multiple service.

* The following are some of the companies using Kling Machines:
Allis-Chalmers Mfg. Co. Auto Specialties Mfg. Co.
Bethlehem Steel Co. Inc. Carrier Corporation Grand Iron Works Inc.
Commercial Tank and Welding Co. L. B. Foster Co. Kyle and Co.
Link-Belt Co. Vincennes Steel Corp. Wabash Railroad Co.

For detailed description of the Kling "Combination" and all the jobs it can handle, send for new Bulletin 347.

KLING BROS. ENGINEERING WORKS • 1320 North Kostner Avenue, Chicago, Illinois
Export Distributor: Simmons Machine Tool Corporation, 50 East 42nd St., New York 17, N.Y.

Since 1892



...an investment in speed!



Friction Saws



Double Angle Shears

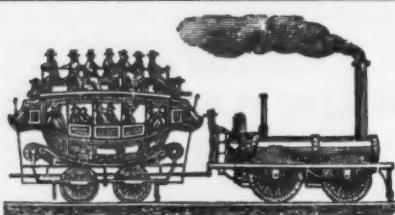


Punches



Plate Banding Rolls





The Past...



The Future—

The slow steps of the past are gone . . . for the present, the future, get better production and finer finishes with Whitton Precision Spindles.

Equip your new Surface Grinders with Whitton Spindles . . . for easy adaptability and for modernizing your old machines.

These rugged Spindles are for today, tomorrow . . . and for high production. They're made to last long . . . powerful springs prevent chatter regardless of wear or temperature changes, and the sealed-in lubrication requires no attention. Whitton Spindles assure micro-finishes . . . the Spindle assembly is precision balanced on its own bearings, which are the most accurate obtainable.

The present, the Future, and Whitton Spindles . . . all teamed for you.

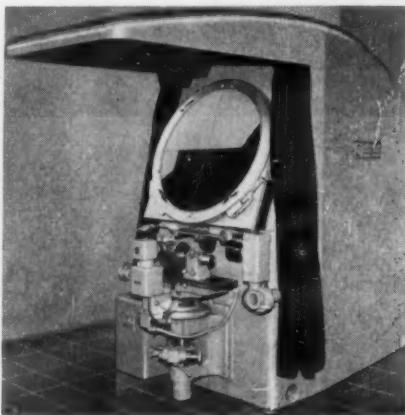
**THE WHITTON
MANUFACTURING CO.**

217 High St.

New Britain, Conn.

Optical Comparator Features 30-Inch Screen

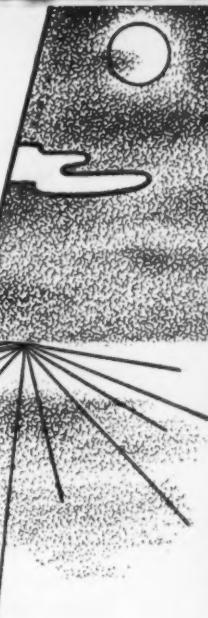
Jones & Lamson Machine Co., 521 Clinton St., Dept. 710, Springfield, Vt., has introduced the Standard Model FC-30 Optical Comparator which features a 30-in. screen. The wholly integrated design, built to precise machine tool standards, is said to allow the operator to easily stage cumbersome parts on the low-level work table and to work within inches of the eye-level viewing screen which is 56 1/2 in. from the floor to the center line. Elec-



Jones & Lamson Standard Model FC-30 Optical Comparator

tronically controlled, variable speed power elevation provides quick, precise, measurements to 0.0001 in. with fingertip control. Carbide-tipped micrometers, graduated for direct reading in either direction, are combined with the micrometer zeroing anvil. A quick zeroing vertical measuring dial is graduated for direct reading up or down, and all measuring dials are illuminated. A 6-in. diameter projection lens is applicable to the machine. The hood on the FC-30 allows permanent photographic records to be taken direct from the viewing screen even under adverse lighting conditions.

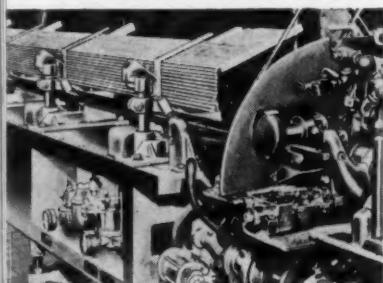
Through the 4th Dimension Time Barrier to New Production Highs



LIPE AML BAR FEED

gears machine production to the steady flow of Time

All industrial results are achieved in Time . . . vital 4th dimension that measures output, costs, profit. Shorten the time gap between operations . . . shorten the time when machines are "cutting air" . . . keep machines producing at a steady optimum rate during the fatigue slow-down from 10:30 to noon, and from 3 P.M., till closing time . . . and you are getting 4th Dimension production. Production that is geared to the steady flow of Time.



Lipe AML Bar Feed Produces from 30% to 100% More Output by Eliminating Time Losses

Time losses account for the enormous differences in output among workmen. By eliminating these losses automatically, the Lipe AML Bar Feed boosts overall production from 30% to 100%. That's because stock is fed to the machine independent of the operator. Constant pressure behind the stock assures uniform speed of feed. No feed fingers to fail or mar stock. No multiple feed-outs, even on the longest pieces.

Mail the coupon now for
free literature giving
full details on the Lipe
AML Bar Feed.



LIPE-ROLLWAY CORPORATION
Syracuse 4, N. Y.

Sure, I'd like to know more about the Lipe AML Bar Feed. Send me your free booklet.

Name Title

Company

Street

Other features of the FC-30 comparator include one minute vernier for angle measuring; table rotation up to 15 degrees right or left; high intensity projection lamphouse adjustable for work clearance where needed; colinear reflection attachment for brilliant surface illumination; positive mirror locator for easily changing magnifications for shrink tolerances; precision lenses from 5 to 100 magnifications (up to 250 magnifications on special applications) with 0.300 to 6 in. aperture and 2.375 to 12.500 in. focal clearance; ball bearing slides on four table styles with lateral measuring ranges from 4 to 8 in.; and capacity between centers from 8 to 24 inches.

Heavy-Duty Milling Machine Is Used In Conjunction with Special Milling Equipment

A heavy-duty floor-type milling machine which is designed for use in con-

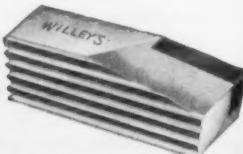
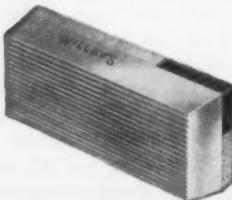
junction with special milling equipment on M-48 tank hull production operations has been announced by The Motch & Merryweather Machinery Co., Penton Bldg., Cleveland 13, Ohio. The bed of the machine is a heavy normalized steel fabrication to which large cast iron ways have been mounted. The ways carry the saddle, upon which is mounted a housing having vertical ways for mounting the horizontal spindle milling head. Hydraulic cylinders are provided to feed the saddle at a variable rate on the main bed. The housing is positioned hydraulically on the ways provided on the saddle. A special barrel-type multiple stop is supplied to position the movement of the housing forward to predetermined locations. Milling head feed vertically in either direction is arranged hydraulically. All sliding way surfaces have non-metallic liners.

The milling head is the M&M single speed type with additional speeds

SERRATED CUTTER BLADES

Carbide Tipped with Willey's Metal

Serrations are ground after heat treating, for greatest accuracy. Send your prints or a sample of the blade you are now using. Also specify grade of carbide—or the material to be machined. We also make solid carbide blades for various cutters. Write for prices and catalog.



SPECIAL TOOLS—Prompt quotes on receipt of prints

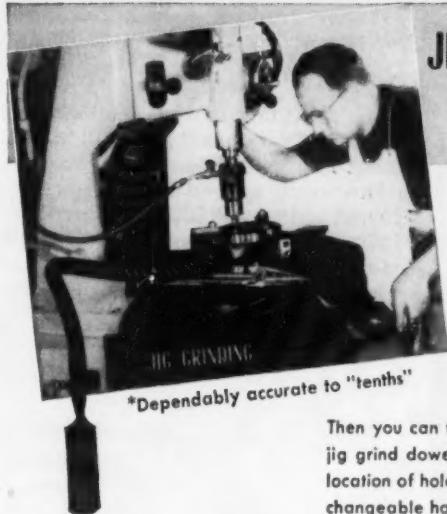


WILLEY'S CARBIDE TOOL CO.

SOLE MAKERS OF WILLEY'S METAL

1342 W. Vernor Highway

Detroit 1, Michigan



JIG GRINDING ACCURACY *guaranteed**

EASILY CONNECT

from this jig grinder to jig borer or mill (The "Vulcanaire" has infinite controlled speeds 30,000 to 65,000 R. P. M.)

Then you can finish grind in hardened steel to "tenths" . . . jig grind dowel holes square with a ground base . . . move location of holes in hardened steel blocks . . . jig grind interchangeable holes in hardened sections . . . grind small holes with diamond impregnated mandrels . . . grind contours and relief with tungsten carbide burrs . . . grind radii in die sections . . . eliminate jig bushings in tools where close spacing is essential.

Other infinitely controlled air driven spindle applications

Place spindle on most any machine. Use it for finishing contours on hardened steel working surfaces . . . burring or milling die castings . . . routing wood contours . . . carbide milling or finishing slots . . . finishing holes in hardened steel to "tenths" . . . grinding with diamond wheels, carbide burrs, or diamond impregnated mandrels.

Advantages—10 micro finishes using carbide mills . . . 6 micro finishes using mounted points, operates at any angle . . . air driven, air cooled, overheating prevented . . . speed controlled at optimum point . . . 3½" long motor uses little working space . . . By controlling speed at any point you abolish need for many constant speed spindles.



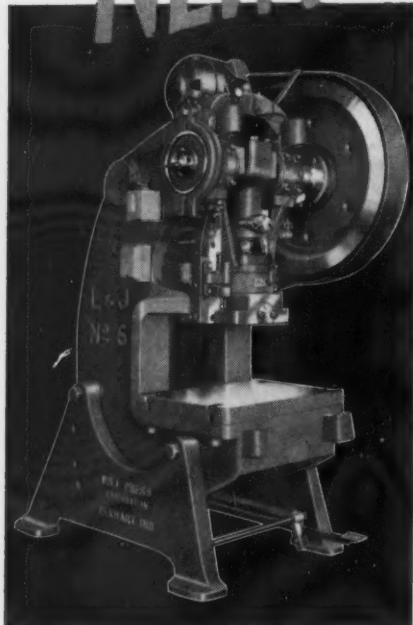
Vulcanaire
It's built by toolmakers for toolmakers.

MAJOR VULCAN SERVICES

Engineering, Processing, Designing and Building, Special Tools, Dies, Special Machines including the Vulcan Hydraulics that Form, Pierce, Assemble and Size.

VULCAN TOOL CO. • PRITZ AND HIGHLAND • DAYTON 10, OHIO

NEW!

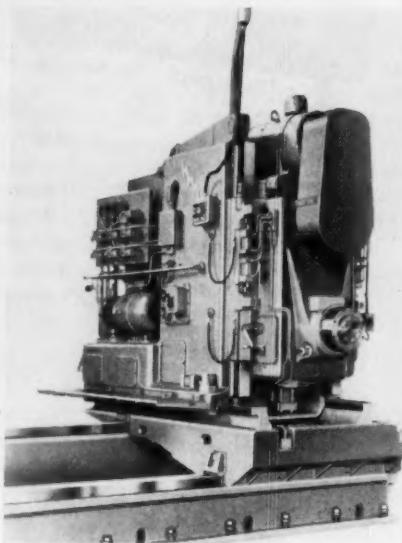


65-ton L & J Press

New No. 6 press featuring greater efficiency—lower production costs—heavy rigid frame—extra deep throat—replaceable bronze bushings in main and upper ram bearings—buttress threads on ram screw—hard bronze ball seat—roller bearings in flywheel or main gear and backshaft mountings—long, precision-scraped gibs—air clutch available. Also made in backgeared model. Other sizes 6 to 80 tons. *Write for literature.*



available through change gears. Seventy-five horsepower is introduced directly into the milling head through a multiple V-belt with a large bull gear, providing flywheel action to the spindle. Two inches of quill adjustment is provided for cutter wear and adjustment, as well as a manual lock to secure the quill after location. Each individual moving unit of the machine is equipped with hydraulically actuated power clamping with an interlock

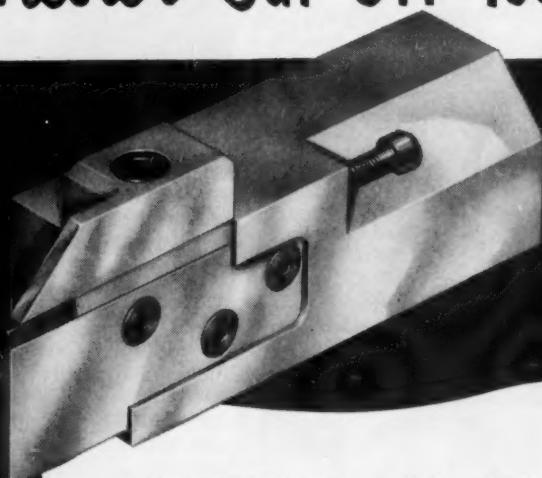


Motch & Merryweather Heavy-Duty Floor-Type Milling Machine

to prevent movement of that member until the operator has unclamped from the ways. Automatic pressure lubrication is provided to all contact surfaces and bearing points. The hydraulic tank, control panel and hydraulic panel are contained on the housing member, eliminating most of the flexible hose requirements. According to the manufacturer, approximately 50 per cent of the milling head, in relation to the ways on the housing, is cradled between the ways.

Quick-Change . . .

Manchester Cut-Off Tool . . .



SELF CENTERING



● New P.D.Q. "Manchester" cut-off tool offers 15 SECOND tool change. Loosen only one screw to change carbide insert. "V" design on support blade and insert makes this tool self-centering and highly accurate. Adjustable rear stop provides positive insert backing and quick adjustment after insert is re-ground.

Tools are available for turret lathes, engine lathes, automatics and cut-off machines... Write for literature and specifications covering ALL the new "Manchester" tool features.

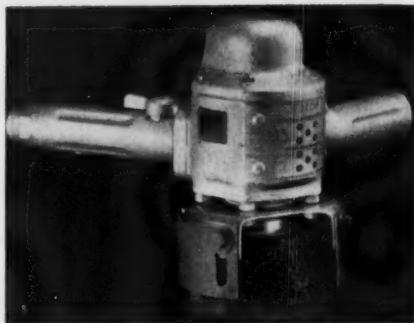


PORTAGE Double-Quick TOOL CO.

1041 SWEITZER AVENUE • AKRON 11, OHIO

Lightweight Vertical Grinder Has Overall Height of 7 Inches

Identified as the Type B-7, a lightweight vertical grinder for cup wheels, cut-off wheels, sanding pads and wire brushes has been announced by The Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23, Ohio. Weighing 6 1/4 lb., the tool measures only 5 1/2 in. to the top of the spindle washer and is 7 in. high overall, including the spindle, making it ideal for working in close



Rotor Type B-7 Vertical Grinder

CAMS

Fully equipped modern machine shop with extensive **Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding** facilities as well as modern **Cam Milling and Cam Grinding** equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC.
23-16 44th Road Long Island City 1, N. Y.

SHARP NAMEPLATE MARKING

Model No. 4



The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

NAMEPLATE DETAIL PRESS.

- Simple Operation
- Perfect Alignment
- Uniform Depth

GEO. T. SCHMIDT, INC.



1806 W. BELLE PLAINE AVE.
CHICAGO • 13 • ILLINOIS

quarters. Speeds of 8,000, 6,000 and 4,500 r.p.m. are available, and the tool has unusual power. Speed is controlled by a quick-acting governor threaded into the rotor shaft, thus eliminating a rocker arm and simplifying maintenance. The dead handle is removable for one-hand operation, and the live handle can be installed in any of four positions for operating convenience. An automatic oiler and an air strainer are built in. A safety handle can be supplied as optional equipment.

The magnesium motor housing is protected against hard wear by a steel band opposite the handles. Helicoil steel thread inserts are used for strengthening cast parts. According to the manufacturer, the grinder has sufficient power for using 7-in. cut-off discs; 4, 5 or 6-in. cup wheels; and 5, 7 or 9-in. sanding pads at proper

IMPORTANT NOTICE

The Genuine MAUSER
VERNIER CALIPER

IS NOW MADE OF
STAINLESS STEEL
THROUGHOUT

\$14.75
PPD



AND THE FOLLOWING
IMPROVEMENTS HAVE BEEN ADDED
• SPECIALY LONG VERNIER to read thousandths
• HARDENED PHOSPHOR-BRONZE adjustable gib retains accuracy
• 3 GRADUATIONS - 1/1000" - 1/128" - 1/10 mm in back
Request Illustrated folder showing complete line of
MAUSER Toolmakers Calipers, Height Gages, Bevel Pro-
tractors and Tool Stands.

GEO. SCHERR CO., INC.

200-MM Lafayette St., N. Y. 12

RING

PUNCHES DIES

**MANY SHAPES
and Types**



Round



Square



Oblong



Rectangular

PLUS

Blank, Pilot,
Solid Head Quill,
Slug Ejector
Punches, and
Retainers.

Specials made to
your specifications.

GET YOUR
RING
CATALOG
TODAY!

RING PUNCH & DIE CO.

108 Foote St. • JAMESTOWN, N. Y.

NEW CATALOG!
Just off the press!



20 pages illustrating our complete line of perforating products. Detailed dimensions and prices for each size given. Available for the asking.

RING PUNCHES & DIES

Hard...

Tough...

Concentric

Precision-made of both Carbon Vanadium and high carbon, high chrome steels.

WRITE FOR CATALOG TODAY

Exclusive distributor wanted for the
State of California.

speeds. Guards for cup wheels or cut-off wheels are furnished as standard equipment.

Portable Band Saw Blade Welder Incorporates Special Forging Action

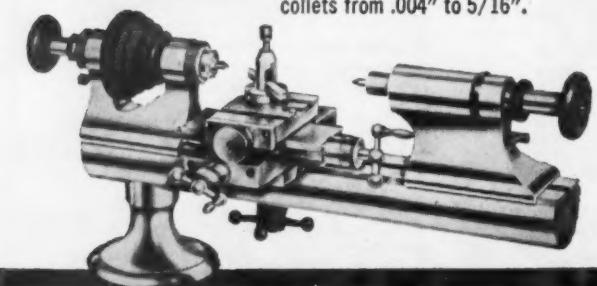
Kasson Die & Motor Corp., 32-14 Northern Blvd., Long Island City 1, N.Y., has announced that the Bren/Weld Portable Band Saw Blade Welder now

incorporates a special forging action, identified as "Vibra-Forge," which is said to achieve a secure weld, eliminating the breakage of blades at the weld. The heart of the forging unit is a vibrating mechanism which actuates the welder's movable jaw. As the two ends of the saw blade are brought together by the jaws, a hammering or forging action is produced, resulting in a strong weld.

The welder is a compact, portable unit which is designed to butt-weld all blades from $\frac{1}{16}$ to $\frac{3}{4}$ inch. The unit incorporates a

SMALL INSTRUMENT PARTS ARE MADE BEST
ON *LEVIN* LATHES

Twenty-three models for all types of work. 4" swing,
Bed Length 12" or 18"; over 100 stock sizes of
collets from .004" to 5/16".



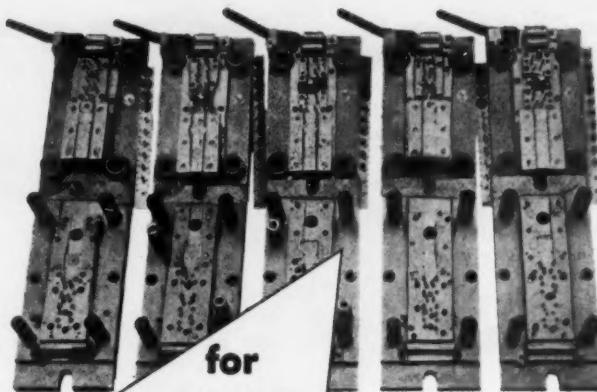
Send for Catalog L describing Lathes for tool work,
second operations; turrets and full line of accessories.

LOUIS LEVIN & SON, INC., 3610 SOUTH BROADWAY, LOS ANGELES 7, CALIF.



Bren/Weld Portable
Band Saw Blade
Welder

large, heavy-duty transformer, a built-in grinder and a double gage to check thickness of weld on flat saws. Operating on 110-volt, 60-cycle a.c., the welder weighs 35 lb. and measures $7\frac{3}{4} \times 12 \times 7$ in. overall. The welding jaws are constructed of copper.



for
precision
jobs like this....Moore Jig Borers
and Jig Grinders are
"MADE TO ORDER"



NO. 2 MOORE JIG BORER.
Range 10" x 16" x 16" height.
Features infinitely variable
spindle speeds, three power
feed ratios, centralized controls.



NO. 2 MOORE JIG GRINDER.
Range 10" x 16" x 16" height.
Grinding speeds from 12,000
to 60,000 rpm. Infinite feeds
up or down; spindle-housing
heat control; features slot
grinding attachment.

Moore Jig Borers and Jig Grinders are made to order for jobs that require precision hole location—and plenty of it.

Take, for example, these five progressive compound dies used to pierce, shave, gut and blank intricate timing-device parts.

Holes in punch plate and stripper were jig bored in a No. 2 Moore Jig Borer. Holes in the corresponding die parts were jig bored in the same precision machine, hardened and then jig ground in a No. 2 Moore Jig Grinder. Perfect line-up was insured, since all holes had to be held to $\pm .0002"$, both for position and hole size.

The No. 2 Moore Jig Borer, with its built-in system of accurate lead screws, can spot, drill, bore or ream all holes in a workpiece to "tenths" with minimum tool changes. The No. 2 Moore Jig Grinder can accurately contour grind, slot grind and form grind die sections in a third of the time required by other means.

These Moore toolroom teammates provide a one-two punch that can knock the fat off your die-making costs. They supply an *Engineered Hole Location Service* that permits tool and die sections to be produced concurrently...puts die-making on an interchangeable-parts-and-assembly basis...lengthens die life...saves you time and money all along the line.

Write today for our detailed literature that pictures and describes many toolroom and production jobs for which Moore Jig Borers and Jig Grinders are made to order.

MOORE SPECIAL TOOL COMPANY, INC.
730 Union Ave., Bridgeport 7, Conn.

ADD  TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

Reversible Plug Thread Gage Is Adjustable for Use As Depth Gage

John Bath & Co., Inc., 20 Grafton St., Worcester 8, Mass., has announced a pin-type reversible plug thread gage which is adjustable for use as a depth gage. The gage is made of carefully selected high speed steel, hardened to ensure long life. The gage is ground and lapped to exacting standards and features red and green locking nuts which provide positive, in-



Bath Pin-Type Reversible Plug Thread Gages

stantaneous "go" and "no go" identification. The gage is stocked in No. 0 through $\frac{3}{4}$ in. in N.C., N.F., U.N.C. and U.N.F., classes 2B, 3B, 2 and 3. Sizes 0.760 in. and larger can also be supplied.

AUTOM



CONTINUOUS HINGES

Manufactured by

**AUTO MOULDING
& MFG. CO.**

WRITE FOR STOCK LIST

1114 E. 87TH ST.

CHICAGO 19

Memory Device Is Used to Control Unit for Continuous Gaging

Pratt & Whitney, Division Niles-Bement-Pond Co., 25 Charter Oak Blvd., West Hartford 1, Conn., has announced the "Proportional Syncronizer," a device for storing a meter reading of varying magnitude and reproducing that information at a later period in a process, synchronized with the speed or movement of the processing line. In operation, a meter reading from a gage is applied to the memory unit through a self-balancing electronic control circuit. The device storing this reading is driven from the process line in the same relation that the material is progressing through the process, and the advancement of

WALTHAM SUB-PRESSES

... for precision work



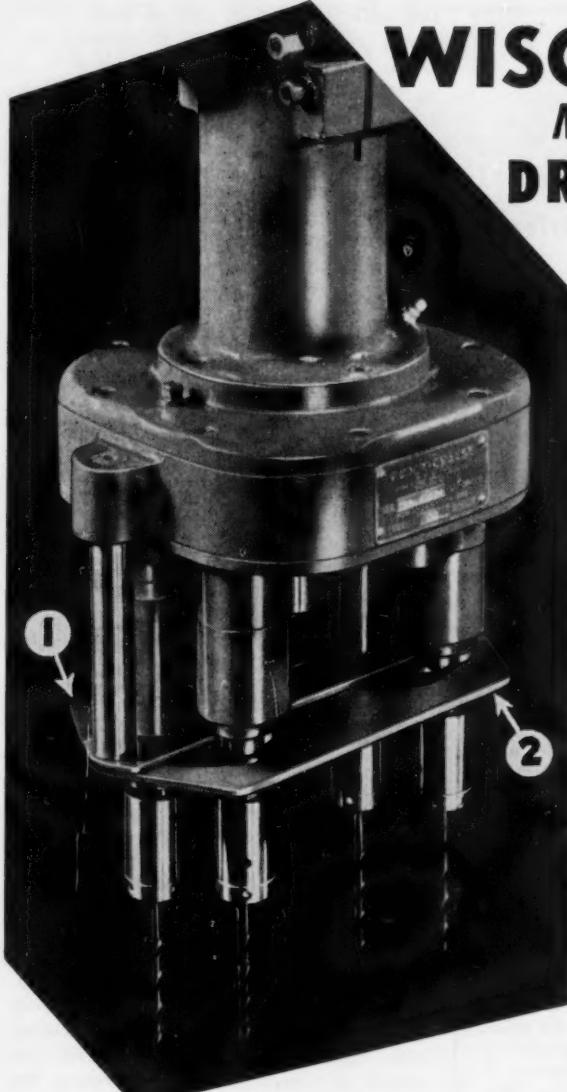
Exact alignment and constant precision can be maintained throughout life of die. Made in 9 sizes. Babbitt bearing is tapered on outside and can be forced downwards. This reduces inside diameter to fit plunger when latter becomes worn through use.

Write for further information.

WALTHAM MACHINE WORKS



BOX 48
WALTHAM, MASS.



WISCONSIN

Multiple

DRILL HEADS

Adjustable and Fixed-Spindle Types

Adjustable Spindle Heads have Dual Positioning Plates for fast, accurate set-ups that "stay put".

Positioning and Locking Templates are furnished for each bolt circle or hole pattern . . . to your exact specifications.

Half-hole Positioning Plates (1) make it easy to swing spindles into place quickly. Locking Plates (2), with full holes, are mounted on support posts to lock set-ups securely against shifting.

6 Capacity Ranges . . . from "Light Duty" to "Extra Heavy Duty". Standard Models have 2 to 8 spindles. Special Models built to order.

1. Half-hole Positioning Plate.

Send print of Hole Pattern for estimate.

2. Locking Plate has full holes to hold spindles in place.

WISCONSIN DRILL HEAD CO.

BUTLER, WISCONSIN

UNIVERSAL DRILL BUSHINGS

*the production-tools'
best friend*



**reduce tool wear • help
prevent tool breakage •
prolong tool life**

Universal Bushings help keep tool costs down for several reasons: their super-finish bore helps reduce tool wear • their blended radius helps prevent tool hang-up and breakage • their 100% concentricity and hardness tests insure accuracy and uniform high quality • their knurled heads provide quick, sure grip • available in a complete range of standard diameters and lengths • For complete information, write to the office nearest you—Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Avenue, Kenosha, Wis. — or the home office.

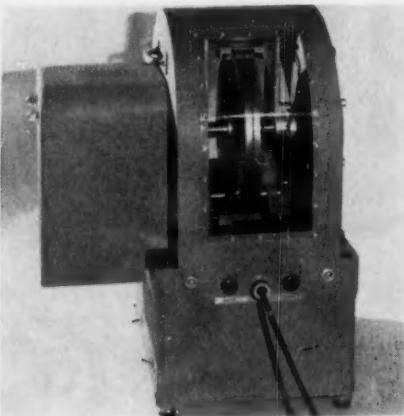
**UNIVERSAL
ENGINEERING COMPANY**

FRANKENMUTH 9, MICHIGAN

176-B

the information on the memory unit is in relation to this movement in both speed and distance.

An example of the Proportional Syncronizer being applied is in the control of a process where steel strip, of varying thickness, is being formed into tubing and seam welded. The welding current must be varied in accordance with the thickness of the strip. If the current were held constant and the material became thicker, a weak weld would result; and if the material became thinner, the



Pratt & Whitney Proportional Syncronizer

seam would be burned. Since it is said to be impractical to measure the thickness of the material at the point of welding, it is done before forming into a tube. The Proportional Syncronizer is therefore used to convey the information on thickness between the point of measurement and the point of welding, and to control the welding current accordingly.

The P&W Proportional Syncronizer can be applied to the storage of any meter reading of varying magnitude where subsequent use of this meter reading is required in a process operation.

QUIET! **FULFLO** VALVE AT WORK!

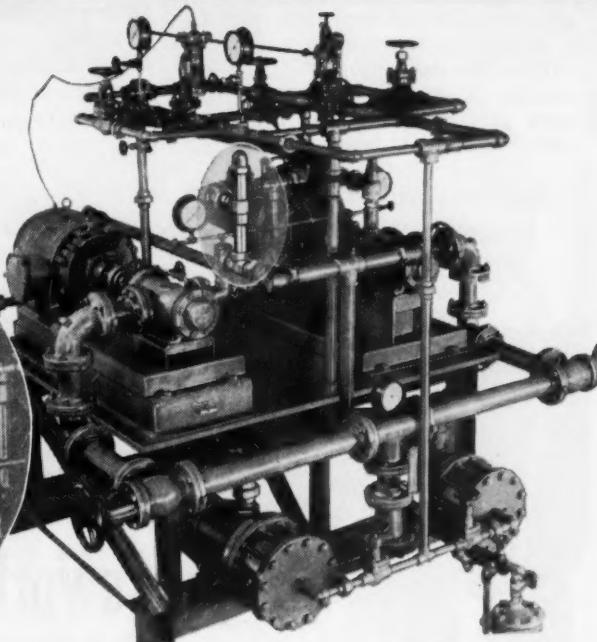
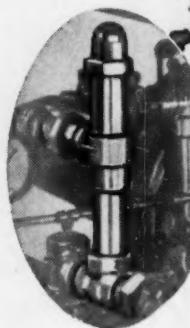
Quiet . . . Efficient . . . Constantly Maintaining Pre-Determined Pressure

FULFLO PISTON-TYPE OIL-RELIEF HYDRAULIC VALVES

an integral factor in
equipment built by

**NATIONAL
AIROIL
BURNER CO.**

Philadelphia, Pa.



Simplest and most efficient valve in America . . .
no unnecessary parts. Pre-determine pressure from
5 springs . . . install . . . that's all.

NON-CHATTERING . . . because the cylindrical
piston closes off the port in a shearing manner thus
relieving pounding or chattering noises in valves
using disc seats.

Write for your personal copy of
FULFLO MECHANICAL DATA BOOK
Please state if for Valves, Pumps or both.



THE FULFLO SPECIALTIES CO. Inc.
PUMP AND VALVE MANUFACTURERS
BLANCHESTER, OHIO

Unit Provides for Deep Penetration of Heating

Lindberg Engineering Co., 2469 W. Hubbard St., Chicago 21, Ill., has announced a motor generator control and heating station for forging, hardening, brazing or annealing operations where deep penetration of heating is desired. Motor generator sets with frequency cycles of 960, 3,000 or 9,600 and power inputs ranging from 50 to 1,250 kw. for use with the station are available. The station has been designed to enable metering to be located on either the front, right or left

side. The meters can thusly be placed where the operator can easily see them, regardless of where it is necessary to place accessory equipment. The output transformer can be installed or removed through either the front or rear of the station. The output transformer busses can be either vertically or horizontally oriented for different types of work coils.

A supervisory system of "Check-lites" maintains a constant check on air temperature, water temperature, high voltage interlocks, water flow and other operating conditions of both motor generator and work stations. The lights instantly

Now's the time to discard costly, obsolete methods... replace with FEDERALS for

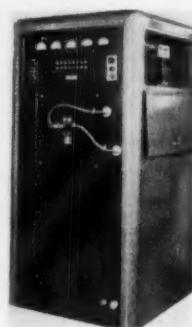


Write for new Catalog

THE FEDERAL PRESS COMPANY
504 Division St., Elkhart, Ind.

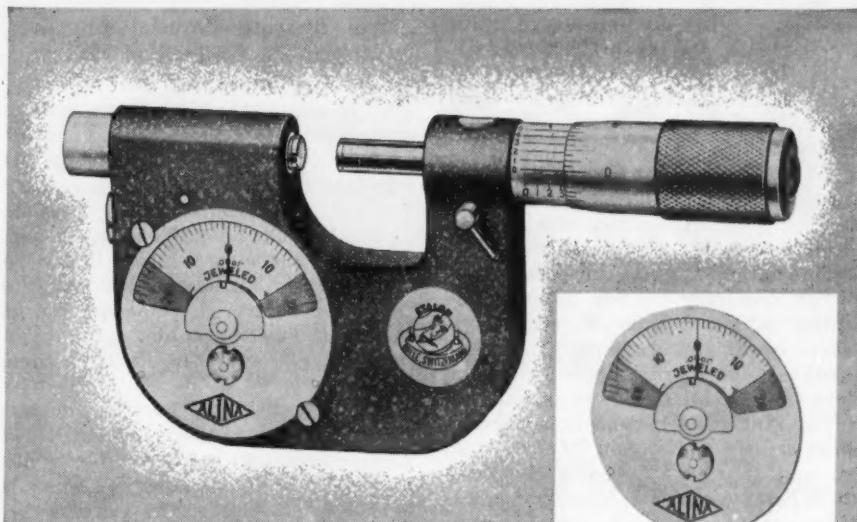
more
profitable
presswork!

Modernize with new Federal Dial Feeds and watch your production go up, and costs down! Rugged, precision-built, versatile, this press does three to five times the work of a standard press; cuts downtime, reduces accidents, eliminates expensive equipment. Finest materials and workmanship. Sizes, 6 to 80 tons. Automatic feed and ejectors, if desired.



Lindberg Motor Generator Control and Heating Station

reveal abnormal conditions at any of the many protective devices. Operations may be timed automatically by means of a four-circuit synchronous timer capable of controlling three operations in addition to



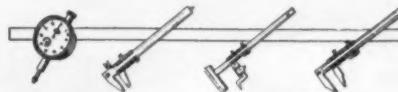
NEW! Etalon No. 25N Indicating Micrometer

ALWAYS REPEATS!

The Etalon No. 25N combines the precision of the dial indicator with the accuracy of the micrometer screw. It eliminates the chance of human error—"feel"—common to setting an ordinary micrometer . . . eliminates the need for "go and no-go" gauges, since you can set it to the required size, lock it and then gauge your parts. Retractable anvil permits quick and easy introduction of the part to be checked without danger of scratching. Load on the anvil retracting mechanism is adjustable; the

mechanism can in no way influence reading. Etalon No. 25N may be used in the hand or mounted in a micrometer stand.

- jewelled
- shock-proof
- variable anvil pressure
- carbide measuring faces
- dial and micrometer barrel graduated in .0001"
- one piece hardened stainless steel screw



Ask your dealer to show you the complete selection of ETALON instruments or write

ALINA CORPORATION

401 Broadway, New York 13, N. Y.

In Canada: Swiss Instruments Co. Reg'd., Granby, Quebec



the heat cycle. Vernier adjustments are furnished on the first three positions for accurate heat, quench and capacitor contactor. Thirty or 120-second scales are available, is specified. Optional equipment includes a water-cooled variable-ratio output transformer of 300 kw. capacity, permitting efficient loading into a wide variety of work, and work coils with a wide safety factor. A magnetic amplifier, requiring neither tubes or rotating equipment, is offered as optional equipment for supplying regulated voltage to the motor generator field for control of power output.

The station is housed in a durable steel cabinet measuring 39 x 39 x 76 in. and weighs approximately 2,000 lb. A complete line of auxiliary equipment, including work tables, work sinks, work handling mechanisms, and so on, is available in many different combinations to meet requirements of a wide variety of applications.

Ball Bearing Parallel Affords Finger-Tip Control of Heavy Workpieces

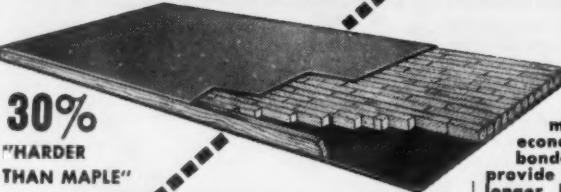
To minimize the friction encountered between a heavy steel plate and the table of a band saw during contour band sawing operations, Montgomery Tools, 7 Tichenor Lane, Newark 5, N. J., has announced a ball bearing parallel which is said to afford finger-tip control of the workpiece. According to the manufacturer, the parallel can be made by any mechanic, using commercial balls and mild steel retaining plates.

The parallel can also be mounted on elevating tables when the workpiece hangs over the saw table. When laying out work, handling can be made easier by inserting the parallel between the workpiece and the surface plate. Because of the accuracy of ordinary commercial balls, the top surfaces, it is claimed, will be parallel to the surface plate.

NEW!
WORKBENCH TOP
.... RESINWOOD

Shop Top

30%
"HARDER
THAN MAPLE"



Available through selected industrial distributors in principal cities or write direct for sample and price list.

For All Industries
TOUGH **WARP-FREE**
SPLINTER-PROOF

RIMCO
MILLWORK

ROCK ISLAND MILLWORK COMPANY

Established 1868

RESINWOOD DIVISION

336 MODERN MACHINE SHOP

Rock Island 6, Illinois

November, 1954

ShopTop quality is superior to maple — with up to 50% greater economy. Select kiln-dried cores, bonded under pressure and heat, provide a built-in impact cushion to give longer life. Smooth Resinwood facings resist acid, alkali, oil, and grease. For new or replacement work benches. Made in any size to meet your requirements.

stop wear before it starts!



You can obtain almost unbelievable savings in taps simply by keeping them sharp. For once the face of a single tooth begins to wear, the accuracy and life of the tap begins to go down hill very rapidly.

With the Blake Precision Sharpening System, you can: (1) sharpen taps at regular, planned intervals, and (2) sharpen flutes and chamfers of taps to an exceptionally high degree of accuracy.

Far longer tap life, precisely tapped holes are possible with the Blake Chamfer Grinder and the Blake Flute Grinder.

Write for
complete
information
today!



Here is the most delicate part of the tap. If the face of the teeth are reground before wear begins, tap life can be increased several hundred percent.

EDWARD **BLAKE** COMPANY
438 CHERRY STREET • WEST NEWTON 65, MASS.



Black Diamond Precision Drill Grinders • Surface Finish Standards
BLAKE PRECISION SHARPENING SYSTEM

Stainless Steel Calculator

Ulbrich Stainless Steels, Wallingford, Conn., has announced a slide type calculator for stainless steel buyers to



Ulbrich Stainless Steel Strip Calculator

facilitate quick and easy calculation on the purchases of stainless steel strip. The calculator uses as variables the length and weight of cold rolled stainless steel strip and quickly translates into pounds any length and width of stainless steel according to its gauge. The calculator indicates widths from $\frac{1}{8}$ to 12 in., length from 100 to 10,000 ft. and gauges from 0.003 through 0.150. On the reverse side of the calculator is included a slide table

to determine the weight of stainless coil steel, using as variables the coil's inside and outside diameters. According to the manufacturer, the calculator is especially handy for buyers of small quantities of stainless strip and is available free of charge by request on company letterhead.

Gage Selector for Ring and Plug Gages in Fractional or Numbered Sizes

The Threadwell Tap & Die Co., Greenfield, Mass., has announced a gage selector which can be used for both ring and plug gages in fractional or numbered sizes. By setting in the ring gage size, the selector gives threads per inch for N.C. or N.F., thread pitch diameter and minor diameter and gage pitch diameter, go and not go, for American National Classes 2 and 3 and Unified Classes

Machine Bases

Fabricated TO **SPECIFICATIONS**

There's no substitute for "Accuracy" in the fabrication of Plate and Sheet Metal products, nor is there a substitute for "Experience" in the forming and welding of such products. With Littleford you can be assured of accuracy and experience in the fabrication of Machine Bases, Guards, Pans and Louver Covers. Littleford has been serving industry since 1882 and these years of skill and "know how" are ready to serve you too. See how fabricated bases can save you money. Send your blue prints for an estimate of cost or write for the Bulletin on Bases.



LITTLEFORD

LITTLEFORD BROS., INC.
121 E. Pearl St., Cincinnati 2, Ohio



NEW!

Etco-Emrick

TAPPING ATTACHMENTS

THEY RUN IN OIL!

1. All parts and a patented cooling system clutch, run in a pumped oil bath which is factory sealed...resulting in smooth, trouble-free service.
2. Feature for feature, there are no finer tapping attachments made...at any price!

For speed, you just can't beat these new tappers. They combine every feature needed to operate at topmost production speeds, including a rigid chuck spindle supported at both ends by oilite bushings and a new indestructible friction material.

SEE YOUR DISTRIBUTOR

or

WRITE FOR BULLETIN 22A

for full details on sizes, capacities and prices



ETTCO TOOL CO., INC. 598 Johnson Ave., Brooklyn 37, N. Y.

DETROIT • CHICAGO • WORCESTER • SAN GABRIEL, CALIF. Dealers throughout the United States and Canada

SEE YOUR LOCAL
Etco-Emrick
DISTRIBUTOR

He's been carefully selected for his technical know-how, soundness. As a local businessman who depends on your support, he has a personal interest in providing a satisfactory answer to your problems and in giving you fast, efficient service.

1A, 2A and 3A. By setting in plug gage size, the selector shows threads per inch N.C. and N.F., thread pitch diameter and major diameter, commercial tap drill sizes and decimal equivalent and gage pitch diameters, go and not go, for American National Classes 2 and 3 and Unified Classes 1B, 2B and 3B. In addition, the selector provides a short concise definition of the classes and specifications on how to order gages.

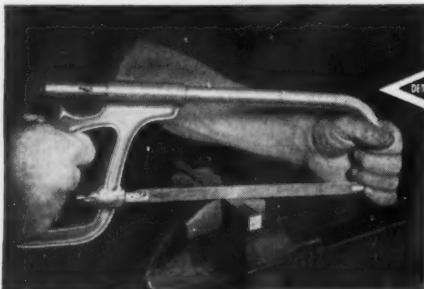
Compact Air-Powered Broaching Machine Provides for Micro Finish at High Production

The Bond Tool and Mfg. Co., Waterbury, Conn., has announced a compact air-powered broaching machine which is said to provide for a micro finish at high production. The machine requires less than 2 sq. ft. of bench space and, it is claimed, is capable of broaching parts to within 0.0002 inch. Custom made jigs and fixtures are said to make possible a positive hold on work-pieces. Operating on as little as 60 p.s.i. air pressure,

**BUY THE BEST
BUY BARNES**

**HAND
HACK
SAWS**

"LOOK FOR THE DIAMOND"



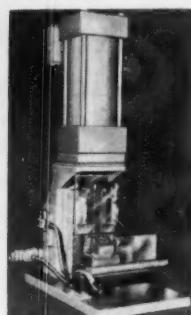
CALL
YOUR
DISTRIBUTOR

Six Barnes Hand Blades, all famous for quality, are available to meet every metal cutting requirement.

ESTABLISHED
1919

W. O. BARNES CO., INC.

1297 TERMINAL AVE. • DETROIT 14, MICH.



Bond Broaching Machine

the machine, it is claimed, is capable of unusual output rates, even on short runs.

According to the manufacturer, the machine is capable of performing on flat or contour surfaces, as well as on irregular surfaces.

Keep your eye on Buckeye

for everything new
in air and electric power tools!



HEAVY DUTY 90° ANGLE HEAD DRILLS

For HEAVY-DUTY applications—designed for minimum maintenance, built for maximum service. Compact, lightweight, lowest overall head height—for ease of handling, even in the tight spots.

No exposed moving parts to create a hazard for tool operator or damage to the work piece. All working parts, including bevel gears, bear-

ings and spindle, are separate units, easily and economically replaced—individually—when worn. Available with $\frac{1}{4}$ "-28 or $\frac{5}{16}$ "-24 thread, or with Buckeye Cone Jaw chuck, $\frac{1}{4}$ " capacity.

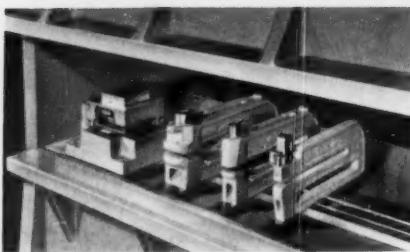
Those are the facts about the NEW Buckeye 90° HEAVY-DUTY Angle Head Drills . . . we'll prove them, in your plant, without obligation. Just tell us where and when, we'll do the rest!

Buckeye Tools
CORPORATION
DIVISION 17 • DAYTON 1, OHIO

producers of
the world's first
successful
rotary air tools

Bed Rail Adapters for Press Brakes

Wales-Strippit Corp., 398 Payne Ave., North Tonawanda, N. Y., has announced a series of bed rail adapters for press brakes that are used with Wales Press Brake Bed Rails for fast, accurate mounting to layout pattern of the independent, self-contained Wales Hole Punching and Notching Units. Spring-check steel balls provide tension to securely hold the

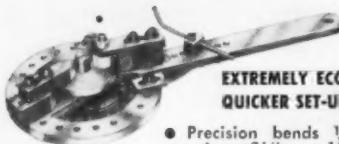


Wales Hole Punching and Notching Units set up on Wales Adapters in press brake

**For metal bending . . .
your best bet is the**

NEW

CURVETTE



EXTREMELY ECONOMICAL QUICKER SET-UPS

- Precision bends $1/4"$ basic wire, $3/8" \times 1/8"$ strip, channel, tube, bar, angle.
- Forms without damage.
- Simple, positive stops.
- Use two for double action.
- Ask about BENDIT JR and BENDIT 15 too!

LUND PRODUCTS DIVISION



Artys Sales Company

11 Broadway New York 4, N. Y. TEL: WHITENALL 4-5480

adapters in bed rail. Two pilot pin holes are located on one side of the adapters for straight line hole punching, and a slot on the other side is provided for front to back mounting for staggered hole punching patterns. A built-in scale on the bed rail and the center line on the adapters facilitate left to right locating and mounting of Wales Units.

Wales Hole Punching and Notching Units with the bed rail adapters are said to reduce tooling to a simple, quick assembly operation. According to the manufacturer, the design of the units automatically aligns punches and dies, eliminates die sets and permits removal and replacement of punches without special tools. Nothing is attached to press ram. After a setup has been run, the same group of units and adapters may be used and reused in other hole punching and notching patterns.



Monarch Precision SHAPLANE Radius Tools

Illustration shows convex cutter for $1/4"$ to $2\frac{1}{2}"$ balls.

FIVE MODELS for LATHES, SHAPERS, PLANERS, BORING MILLS

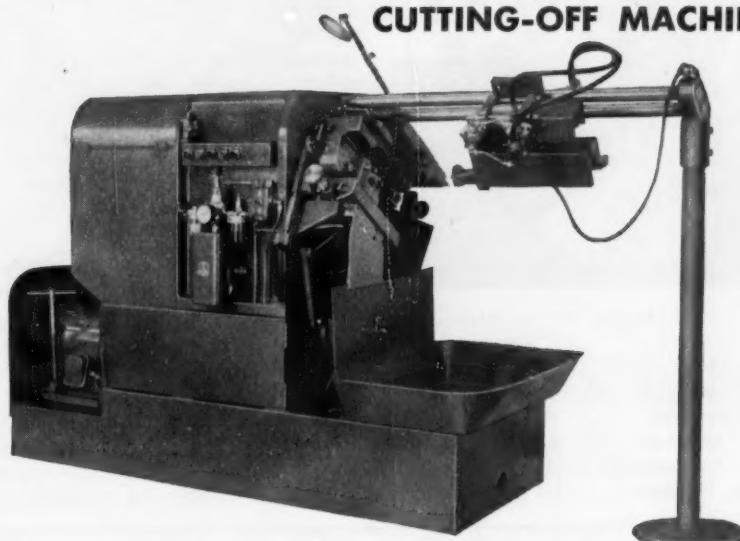
Range $1/2"$ to $3"$ for concave Radii. Also heavy duty models
for radii to $6"$ on planers, etc.

Write for circular

C. B. TEETER, TOOL ROOM SPECIALTIES

4470 Oakenwald Ave., Chicago 15, Ill.

The NEW MODERN AUTOMATIC CUTTING-OFF MACHINE



Cuts Off Tubing, Pipe and Shafting . . . FAST

Cuts off longer pieces than a regular automatic machine. In fact, cuts off any length you want—and cuts it *faster*. If your production requires quantity cutting-off of tubing, pipe or shafting, check the figures below against your present time.

1/2" Tubing

This machine cuts off and chamfers both outside edges of $\frac{1}{2}$ " .030 wall tubing, 5' long at the rate of one every 2.5 seconds.

1 1/4" Cold Rolled

This machine cuts off and chamfers both ends of $1\frac{1}{4}$ " cold rolled, 20" long, at the rate of one every 20 seconds.

1" Tubing

This machine cuts off and chamfers both outside edges of 3" long, at the rate of one every 3 seconds.

These popular, time saving machines are now available in four sizes, handling work up to $6\frac{3}{4}$ " O.D. Their many cost cutting features are described and illustrated in our latest catalog that will be mailed promptly on request.

4" Threaded Studs



Cut and chamfered at one time—in 8 seconds—from 10 ft. length of stock already threaded. ($\frac{3}{4}$ " U. S. Standard.) Clean cut. Clean chamfer. Nuts start easily, with no extra finishing required.

WRITE FOR ILLUSTRATED CATALOG

MODERN MACHINE TOOL CO.
Jackson, Michigan

Leveling Machine Mount Carries Up to 10,000 Pounds

Identified as the LM7, a large leveling Barrymount which is designed to



LM7 Leveling Barrymount

carry up to 10,000 lb. per mount has been announced by The Barry Corp., 784 Pleasant St., Watertown 72, Mass. According to the manufacturer, the mount allows heavy machinery to be installed and leveled in a

matter of minutes, without bolting or shimming. The unit permits height adjustments for leveling up to $\frac{1}{2}$ inch.

Advantages that are said to be provided by the LM7 Leveling Barrymount include easy installation and maintenance, minimum wear and tear on adjacent machinery and on the plant structure itself, reduction of noise and elimination of "floor walking" of heavy machines.

Optical Comparator Is Designed for Production Inspection of Small Parts

George Scherr Optical Tools, Inc., 200-MM Lafayette St., New York 12, N. Y., has announced the Wilder Model C Small Parts Comparator which is designed for the 100 per cent production inspection of small odd-shaped parts against an enlarged draw-

Easy way to handle heavy storage bins

You'll save time and effort . . . work with greater ease . . . in moving heavily loaded bins in and out of storage.

Cradled in Roller Bearing Slides, bins roll out at a finger's touch . . . contents are immediately accessible. It's much faster and easier to remove or refill bins; to count or weigh contents. Stops prevent slide from being pulled out more than halfway, bins cannot fall out or spill contents.

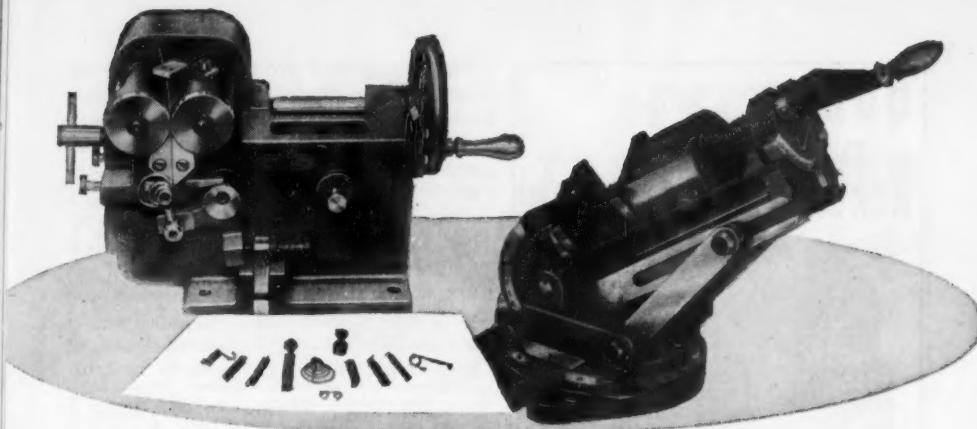
Roller Bearing Stackracks® are individual units that lock together to form storage units of any size, shape or height. Completely flexible, they can be rearranged quickly, without using tools. Get all the facts! Write for catalog.

STACKBIN CORPORATION
1083 Main Street, Pawtucket, R. I.



In Canada:
Wickware-Stackbin, Ltd.,
Ottawa

STACKBIN®
"Stacked and
Still Accessible"



spotlight on two precision, time-saving, labor-saving tools

When you need a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005" to .125", you can produce it in a matter of seconds with the new Perkins Precision Spring Coiler! You entirely eliminate the use of

arbors, yet turn out precision springs — torsion, compression, extension tapered, or special springs — coiled either left or right hand, in any desired length, any diameter from $\frac{1}{16}$ " to 12" and larger, with or without initial tension, and with open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications for replacements or experimental work. Make them fast right in your own shop!



Power model for continuous runs, on welded steel console base.

**EXCLUSIVE DISTRIBUTORS OF
PRECISION MACHINE
TOOLS**

**Connors and Davis
Sales Corporation**

CIRCUIT AVENUE
WEST SPRINGFIELD, MASS.



Accurately set in all three planes in only 15 seconds, this sturdy precision vise made in two capacities saves time and headaches for progressive shop operators and pays for itself quickly. Only

7" high (lowest in the trade), **OMNI-VISE #4**, shown at top, is tough, weighs 74 lbs. Jaws are 4" x $1\frac{1}{2}$ ", open to 4". Base is 9" in diameter with one side straight. Inset shows **OMNI-VISE #2**, a precision low-priced vise. Users find it exceptional for grinding compound angles on carbide tools. Weight, 16 lbs. Height, $4\frac{3}{4}$ ". Jaws, $2\frac{1}{8}$ ". Opening, $2\frac{1}{8}$ ". Base, $7\frac{1}{4}$ " x 5". For grinding, drilling or general work at any angle, by hand or machine, an **OMNI-VISE** is the machinist's choice.

CONNORS AND DAVIS Sales Corporation
411 Circuit Avenue, West Springfield, Mass.

Please send detailed information and prices on:

PERKINS SPRING COILER

hand power

OMNI-VISE #4 **#2**

Name _____ Title _____

Company _____

Address _____

City _____ State _____

QUALITY Depends on ACCURATE INSPECTION



Accuracy of measurement depends on the precision of the measuring tools. Provide your shop and inspection department with dependable and proper inspection tools. MEEHANITE METAL TOOLS, made to close tolerances, are furnished in many types.

Surface Plates — Box Parallels

Slotted Angle Plates

Universal Right Angles

Flat Parallels — Lapping Plates

Toolmaker's Knees — "V" Blocks

Straight Edges (Bridge Type)

Straight Edges (Leveling Type)

Measuring Irons

Masterangle Plates

Angle Attachments

Send for Bulletin

ACME TOOL CO.

73 W. Broadway, New York 7, N. Y.

ing. For optical production inspection only, the instrument is said to combine accuracy, speed and economy, plus operational comfort and convenience. The unit utilizes a horizontal work stage and vertical beam of light which permits many parts to be simply laid flat on the stage without holding fixtures. The screen and stage are positioned so that they are in line with the operator's hand and vision for maximum comfort and speed of inspection. The light source is built



Wilder Model C Small Parts Comparator

back into the instrument, thus causing no discomfort from heat or interference with the operator. Lenses provide erect, unreversed images.

The instrument can also be used for delicate assembly operations because the operator's movements are always seen on the screen in the normal natural way. The unit is light and therefore can be easily carried around the shop, if necessary. It is equipped with one fixed magnification lens, and a selection of four are available; namely, 20X, 25X, 31 1/4 X and 62 1/2 X.

READING BENCH KEYSEATER

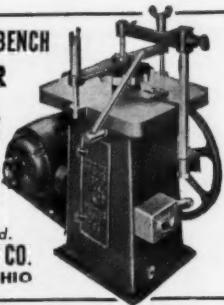
Portable—move directly to job; a time saver for both small and large shops.

3 1/4" stroke; adaptable for other work.

Low first cost—prompt delivery.

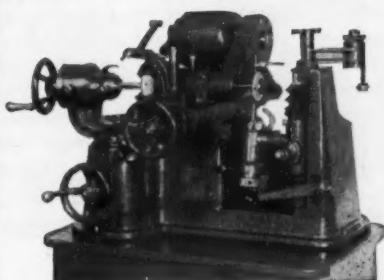
Good dealers wanted.

READING MACHINE CO.
CINCINNATI 37, OHIO



HYBCO

TAP GRINDER

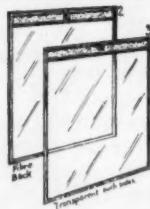


MODEL 1100

- Capacities No. 0 Machine Screw to 1 1/2" Hand Taps.

HENRY P. BOGGIS & CO.

708 East 163rd Street
Cleveland 10, Ohio



WADE ENVELOPES

protect

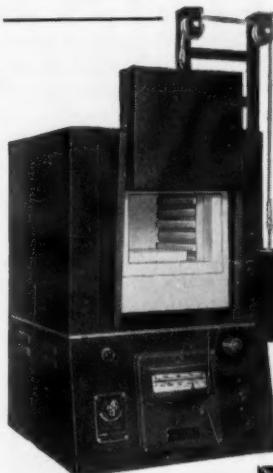
Shop Orders, Drawings,
Blueprints, Etc.

Two styles, No. 2 with fibre back, No. 3 transparent both sides. Non-inflammable acetate windows. Special style or size to order.

Write for details.

WADE INSTRUMENT COMPANY
Dept. M, R.F.D. No. 1, Chardon, Ohio

Designed for TOOL ROOM EFFICIENCY



HUPPERT Heat Treating FURNACE

Range: 300° F. to 2000° F.

Years of satisfactory operation in tool, die and machine shops, as well as laboratories have proven these furnaces to be ideal for production work. Huppert special features include High Temperature, Heavy Duty Kanthal elements—Multi-insulation—counterweighted and tight self-sealing door. Pilot lights indicate furnace operation. All connections factory installed, shipped ready for operation.

Model No.	Inside Dimensions			KW	Prices 220 volt single phase	
	Wide	High	Deep		with Huppert input controller	with electronic temperature controller
869	8"	6"	9"	4	\$280.00	\$480.00
11	8"	6"	12"	4	287.00	487.00
12*	8"	8"	12"	6	367.00	567.00
12A*	8"	8"	18"	9	471.00	671.00

*For 2300° F. add \$95.00 to No. 12 and \$105.00 to No. 12A.
No. 12A can be furnished for 3 phase at no additional cost.
For floor model add \$50.00 to above prices.

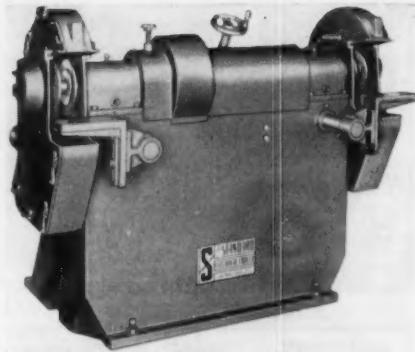
K. H. HUPPERT CO.

6841 Cottage Grove Avenue Chicago 37, Illinois
Manufacturers of Electric Furnaces and Ovens

*Write for literature on complete line of furnaces and ovens.

Infinitely Variable Speed Snagging Grinder

Designated as the Type 10GVS, a double-end infinitely variable speed snagging grinder which incorporates structural plate steel guards with adjustment to compensate for wheel wear has been announced by The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio. Each guard has a stationary exhaust outlet. Quick wheel change, it is claim-



Standard Type 10GVS Double-End Infinitely Variable Speed Snagging Grinder



SOMERSET Radius Dresser

SAVES TIME

Thousands of Somerset Dressers in service. Offer outstanding features — Wheel is dressed from below, avoids removal of guard. Stop pins permit rotation thru 180° or 90° either direction. Wearproof bearing is dustproof.

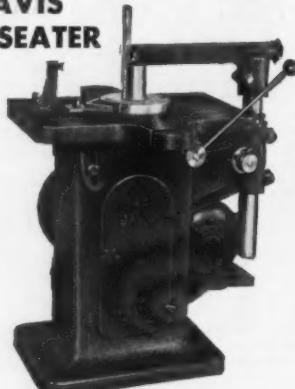
Write for illustrated folder. Immediate Delivery.

SOMERSET TOOL CO. 320 Virginia St. Hillside, N. J.

**Why Use A Shaper
to cut Keyways when a
DAVIS
KEYSEATER**

will
do the
job so
much
quicker
and
better?

•
Send
for
Circular



DAVIS KEYSEATER CO.

Exchange and Glasgow Sts.
ROCHESTER, N. Y.

ed, is facilitated by quick-acting latches securing the hinged covers, and no wrenches or tools are needed. A 10-h.p. motor on the rear of the base moves in a dovetailed slide which has an adjusting gib for rigidity. A magnetic starter with separate start-stop push-button station is included. The grinder is designed to accommodate two 20-in. diameter x 3-in. face grinding wheels, and the infinitely variable speed drive is said to maintain a constant cutting speed throughout wheel life with simultaneous adjustment of the grinding wheel guards for maximum protection in relation to worn wheel diameters. Simultaneous guard adjustment and speed change is accomplished merely by turning a handwheel.

LASSY

TAPPING MACHINES

are used
for testing taps
by three
leading tap
manufacturers

LASSY TOOL CO.
PLAINVILLE, CONN.



PART FEEDER

Automatic Part Feeders are adaptable to production jobs requiring the handling of small parts. Parts poured into hopper are arranged and fed down track in proper order.



Single & Multiple Spindle Magazine Feed Power Screw Driving Machines

For driving screws faster in products assembled with screws. These machines operate easily and require very little attention or adjustment when put in production.

Send sample parts when writing for quotation.



COOK & CHICK CO.

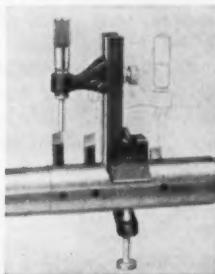
638 S. MILLER ST.

CHICAGO 7, ILL.

SAVE TIME

With

Bartelt Gages



Use a Bartelt Pedestal Micrometer for setting boring tools and for many other shop operations requiring accurate positioning relative to a fixed base. Make settings in one step — eliminate cut-and-try methods. Model B, with reversible slide, shown. Write for literature describing all models.

BARTELT ENGINEERING CO.

1216 PARTRIDGE AVE.

BELOIT

• WISCONSIN



CALDWELL Adjust-A-Leg EQUALIZING and LOCKING SLINGS

With an ADJUST-A-LEG Equalizing Sling, unbalanced and "hard to get hold of" loads may be handled as easily as simple loads. As the tension of the lift comes on, the legs automatically adjust themselves to proper lengths and *frictionally lock in position*. The load is raised level . . . with no fuss, no bother, no figuring — the Sling does it! Sizes $\frac{3}{4}$ -ton to 50-ton.

THE CALDWELL CO., INC., 3412 Auburn St., Rockford, Ill.

WRITE FOR
LITERATURE

According to the manufacturer, the design for vitrified bond wheels will maintain 6,500 s.f.p.m., while the arrangement for resinoid bond wheels will maintain 9,500 s.f.p.m. throughout wheel life. The heavy shaft is accurately machined and ground to size, supported by four ball bearings. The bearing housings are labyrinth sealed, and the entire spindle assembly is accurately balanced. Positive shaft lock is provided for use when

changing wheels. The 4 x 9-in. adjustable work rest at each wheel is supported by the base.

Improved Heavy-Duty Turning Tool Utilizes Carbide Insert

The Gairing Tool Co., 21235 Hoover Rd., Detroit 32, Mich., has announced an improved "Chip-Hog" Heavy-Duty Turning Tool which consists of a carbide insert clamped to a durable high-alloy steel shank. The insert is adjustable two ways and can be quickly replaced, generally being avail-

CARTER GUIDE LINE LIGHTS

"SAVE Time...Money
...Material...Labor"

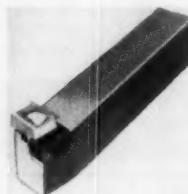
... report satisfied manufacturers using Carter Guide Line Lights for greater accuracy and efficiency in these industries:

Plywood — Lumber — Piano — Furniture — Casket — Wheelbarrow — Cabinet — Flooring — Heels — Bowling Alley — Store Fixture — Sash and Door — Factory and Hand Truck — Box and Crate — Ship Building — Packing — Plastics — Rubber. Carter Guide Line Lights can save for you, too. Write today for details and literature.

CARTER PRODUCTS COMPANY, Inc.

426 Wm. Alden Smith Bldg.
30 Ionia Avenue, S.W.
Grand Rapids 2, Mich

CUTS COSTS
WAY DOWN!



Gairing Improved
"Chip-Hog" Heavy-Duty Turning Tool

able (from carbide manufacturers) with pre-formed front and side clearance angles. The rigidity of the tool, it is claimed, allows maximum feeds and speeds on lathes, shapers, planers and boring mills without the danger of carbide cracks. The tool is said to be equally efficient for semi-finishing and finishing cuts.

RECLINABLE POWER PRESSES



Ideal for general stamping work . . . 4 to 100 tons capacity. Can recline to 40° with perfect safety.

Our catalog contains a wide variety of press types and sizes. Write for it today.

*50th year serving worldwide industry with Patent Percussion, Open Back, Double Crank, Punch, Horn, Toggle and Straight Side Presses, Dial and Roll Feeds.

ZEH & HAHNEMANN CO.
190 VANDERPOOL ST. NEWARK 5, N. J.

THE BETTER BUY

Baldor ASK FOR BULLETIN 321-J

HEAVY DUTY

SHOP GRINDERS

fully guaranteed



With ball-bearings that never require re-lubrication.

AT RIGHT: Baldor Grinder No. 600 series. 1/3 hp., ball-bearing, dynamically balanced motor. 1 phase, 60 cy., 3450 rpm. Two first-grade, individually balanced 6" wheels—1 coarse, 1 fine. Motor stands repeated overloads and WILL NOT BURN OUT. Wide clearance between wheels and motor frame for fast, precision grinding. It's the Better Buy at.....

\$49.00

BALDOR ELECTRIC COMPANY

4380 Duncan Ave., ST. LOUIS 10, MO.

Save your large JIG BORERS for large jobs... put small precision work on the

LINLEY

The Linley Jig Borer provides the means . . . at very low cost . . . of handling your most exacting requirements in precision. With it you can cut costs through having a tool exactly fitted to your small work . . . save your larger machines for larger work.



Specifications

Table Movement:

6" x 10"

Table Size:

7" x 17 1/2"

Send for complete information TODAY!

LINLEY BROTHERS CO.
661 STATE ST. EXT., BRIDGEPORT 1, CONN.

Corrugated Steel Box Features Lapped Ends or Sides

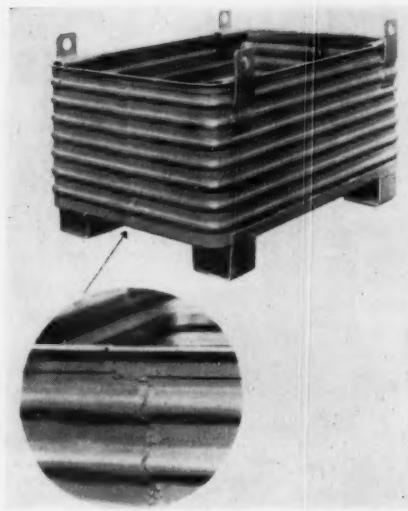
A corrugated steel box with lapped ends or sides has been developed by Palmer-Shile Co., 16022 Fullerton, Detroit 27, Mich. The lapped joint replaces butt straps and butt weld joints and will be standard on all round cornered boxes. The lapped joints are said to give the greatest possible box



NEW RUBBISH BURNER and PARTS BASKET on WHEELS—

- Extra heavy construction. Wt. 55 lbs. Size, 34" high x 24" diameter.
- Basket $\frac{3}{8}$ " x 10" expanded metal. 16 gauge bottom.
- Simply wheel up and down aisle—pick up paper, refuse, etc., wheel outside and burn.
- Also ideal for parts basket, shipping carrier, etc.
- Price \$38.75 Express Prepaid. Immediate shipment.

DANDY BURNER PRODUCTS CO.
Highland Park, Illinois



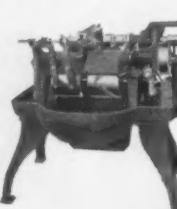
Palmer-Shile Corrugated Steel Box with lapped ends

strength in the handling of heavy duty storage problems.

The box has four-way entrance and may be moved by hand, power lift or fork trucks, or tiered with a portable elevator. It is built to customer size and capacity specifications.

Portable Power Hack Saw Cuts Solid Bar Stock as Well as Thin-Section Materials

Identified as the "Hand-I-Hack," a portable power hack saw which is de-



Thread Studs Faster WITH THE KENT AUTOMATIC STUD THREADER

Magazine feed. Threads both ends simultaneously and automatically. Minimum air cutting time. One man attends several machines.

One machine threads studs $\frac{1}{4}$ " to $\frac{1}{2}$ " diam. One machine threads $\frac{1}{2}$ " to 1" diam. (Both in various lengths of threads and studs.)

The KENT MACHINE CO., Cuyahoga Falls, O.
Drillers . Threaders . Slotters . Countersinkers . Bar Pointers

HOWALD CARBIDE MILLING CUTTERS



PATENTED
END MILL

- **SQUARE BLADES**
Easily Replaced.
- Simple, Accurate
Blade Adjustment.
- Lowest Blade Cost.
- Cutters from $1\frac{1}{2}$ "
to $14\frac{1}{2}$ " dia.



PAT
SHELL
MILL

SEND FOR BULLETIN

W. T. HOWALD

MACHINE WORKS

182 SIGOURNEY ST., BROOKLYN 31, N. Y.

The
"MASTER
COMPAR"
has the
VISIBLE feel

No Arguments as to correctness of reading
due to "feel".

Use it as Comparator, Master Micrometer, Go
& No Go Gage.

1" Range reading in $1/10,000$ "

To attain permanent accuracy at these close
limits, highest precision workmanship and ex-
clusive design of mechanism are of Major
Importance and ONLY found in "MASTER
COMPAR."

Ask for Illustrated
Circular — Code GIOFF

Sold thru Tool Supply Houses
Ask for Demonstration



GEO. SCHERR CO., INC.
200-MM LAFAYETTE ST. NEW YORK 12, N.Y.

COMPLETE LINE OF
PRECISION INSTRUMENTS

"Get them from Gillen"



TAPER PINS
MACHINE KEYS
SPECIAL MACHINE PARTS
WOODRUFF KEYS
GROOVE PINS
Write for Catalog
and Prices

John Gillen Company
INC.

2542 SOUTH 50th AVENUE • CICERO 50, ILLINOIS



Also Available
in LARGER SIZES

A RIGHT HAND TOOL

Release button for movable anvils on RIGHT Hand side
enables you to hold tool the conventional way.

NEW — Resetting to Zero in 5 seconds

Quick adjustable tolerance hands. Heavy TUNGSTEN
CARBIDE anvils will actually measure Out-of-Round-
ness, Ovalness and Taper.

**HIGHER SPEEDS!
FASTER GRINDING!**

kipp

AIR GRINDERS

**MODEL JA
50,000 R.P.M.**

**\$42.00
IN U.S.A.**



Weight 12 ounces;
length 6½ inches;
chuck size ½ inch.
Wheel guard removed
for better illustration.

The RPM's stay up while
grinding . . . not only when the
grinder runs idle. That means
better work—longer wheel life.

High speed grinding with small
wheels was a Madison-Kipp de-
velopment of the late twenties.
It was born out of a pressing need
in our tool room. Because tool
room grinding problems are uni-
versal, we believe it will pay you
to utilize Kipp grinders in your
tool room as generally as we do
in our own.

signed to cut solid bar stock, spacers, bushings, heavy tubing and angle iron, as well as thin-section material, such as rolled forms, structural shapes, tubing, pipe, conduit and cable, has been announced by Lipe-Rollway Corp., 814 Emerson Ave., Syracuse 1, N. Y. Weighing 48 lb., the saw can be carried to wherever the job is located and is said to be capable of cutting metal, plastic or fiber stock of 3 in. or less diameter at any angle from 45 to 90 degrees. The saw blade draw cuts and then lifts on its return



Lipe-Rollway "Hand-I-Hack" Portable
Power Hack Saw in use

stroke, eliminating the necessity for weights. According to the manufacturer, this action enables the saw to be operated vertically, horizontally or upside down. With the work vise of the saw clamped to a stanchion or pipe, the unit is said to be self-supporting, ready to make repeated cuts within a tolerance of 0.010 inch.

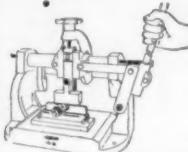
The operation of the saw is fully automatic, shutting itself off after completing a cut. Sawing pressure is regulated by a knurled screw, located on the side of the aluminum frame, which adjusts cutting pressure.

kipp

**MADISON-KIPP CORP.
208 Waubesa St., Madison 10, Wis., U.S.A.**

Marking Machines

- For every kind of marking
- Hand and power models
- Mark steel, other metal
- and plastic products.



The ACROMARK
SERIES 9A
Machine shown
at left will mark
anything
you make.

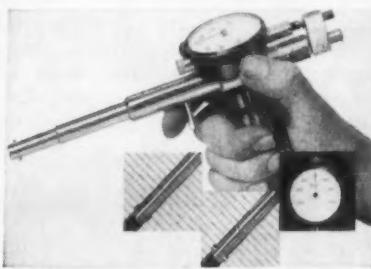
It's lowest in price and highest
in quality. It comes in hand,
motor and air driven models.

Write for complete details.

The
ACROMARK
Company

9 MORRELL ST., ELIZABETH 4, N. J.

PRECISION PLUS!!



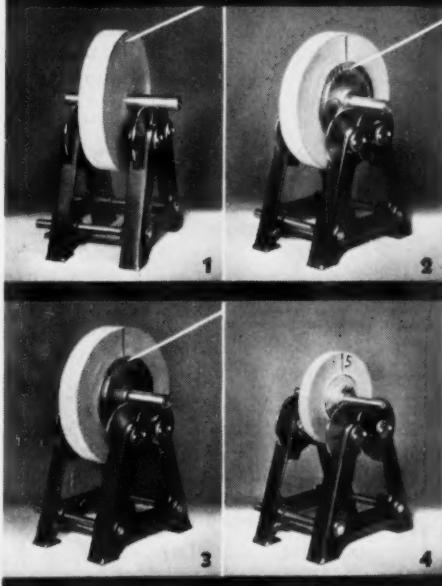
INTERNAL GROOVE GAGES

For Thread Reliefs, "O" Ring
and Snap Ring Grooves

Accuracy to less than $\pm .0001$ —Ranges from
.300" to 6.000"—Inreach to 30".
Lightweight for faster, easier operation.
Write TODAY for full data!

RIMAT TOOL COMPANY

Dept. MM-11, 21 West Dayton, Pasadena 2, Calif.



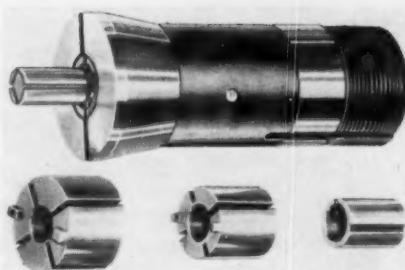
QUICK, EASY WAY
TO BRING GRINDING,
BUFFING, AND POLISHING
WHEELS INTO BALANCE . . .

(1) Balance on Anderson super-sensitive Balancing Way and mark light side. (2) Line up mark with both zeros on Anderson Speedi-Balancer. (3) Turn both discs till wheel balances. (4) Record setting. Wheel is now prebalanced for instant use when needed: just use Speedi Balancer, set to number marked, as outside collar. Save time. Eliminate weights. Reduce vibration. Increase motor bearing life. Improve motor performance. For information on sizes, types, and prices of Anderson Balancing Ways and Speedi-Balancers, write for Bulletin 11-5.

ANDERSON BROS. MFG. CO.
ROCKFORD, ILLINOIS

Collet Arbor Holds Workpieces Internally

Designated as the "Hole-True," an expanding-type collet arbor for holding workpieces internally to achieve precision concentricity of any secondary or final facing, turning, machining or grinding operation has been announced by The Medelton Co., Inc., Dept. M, 335 E. 142nd St., Bronx 54,



Medelton "Hole-True" Collet Arbor and Adapter Bushings

JIG BORING and

Large Precision Machining

Done to your specifications

We Have 13 Jig Borers

KIDDE PRECISION TOOL CORP.

37 FARRAND ST. BLOOMFIELD, N. J.

REID

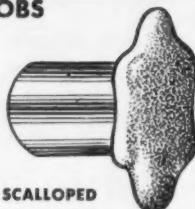
TOOL ROOM ACCESSORIES

C.I. HAND KNOBS

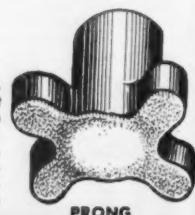


LONG SHANK
With Wrench Hex.

Three styles. Many sizes. Made of fine grain cast iron. Smooth finish. No sharp edges. Low prices. FREE 56 PAGE CATALOG on request describing dozens of items needed in tool room. Top quality. Lowest prices.



SCALLOPED



PRONG

REID TOOL SUPPLY CO.

Muskegon Heights, Michigan

N. Y. Because of internal holding in the bore of the part, the entire length of the part may be finish machined. The face of the part, it is claimed, may be held and machined square to the bore because of accurate linear holding.

According to the manufacturer, the length of the machined part can be held to tenths consistently as the collet does not change position when it expands. The unit is actuated by the drawbar of the machine. When used with a production collet attachment, work may be loaded and removed from a lathe without stopping the spindle.

The collet arbor is ruggedly constructed of hardened steel, ground to precision limits. The set consists of a master collet arbor of $\frac{3}{8}$ in. diameter and three hardened and ground adapter bushings to hold work with bores

Quick
Shipment on

TAPER ATTACHMENTS

For All Lathes—Old or New—

9" to 36" Swing

Write for Bulletin

MASTER-TAPER COMPANY

4531 N. Beacon St., Chicago 40
Excl. Mfrs. of Taper Attachments

\$29.50
to
\$149.50

MICRO-HEIGHT GAUGE

BY FAIRFIELD GAUGE CO.



NO OTHER GAUGE
COMPARES FOR
FAST, ACCURATE
LAYOUT AND
MEASURING

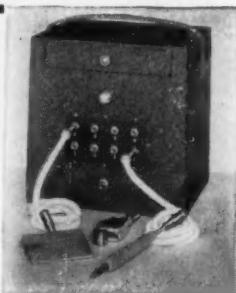
Capacities to
6" when used
with this
Fairfield Gauge
3" Riser

The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3" in thousandths. Use as a scribe for fast layout, or insert dial indicator for quick, accurate inspection.

Exclusive distributor for U.S. and Canada:

CLEVELAND INSTRUMENT CO.
735 Carnegie Ave., Cleveland, O.

MARK
IRON,
STEEL
and
CARBIDES



THE
Etchograph
Mark
Way

Original Electric Etcher, Thousands in Daily Use
Mark hardened parts, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides — quickly — plainly. • Three sizes to meet all requirements.

• Write for circulars and prices.

BREWSTER-SQUIRES CO.

P. O. Box 191

Tenafly, N. J.

HOW TO
INSURE TOP
METALWORKING
PERFORMANCE
for only

\$100



Send for a
trial order of
**ANTI-SCORING
LUBRICANTS**

For top performance on lathe centers, grinding, press fit, stamping, die posts and many other operations — CMD ANTI-SCORING Lubricant can't be beat. It makes your operations smoother, faster, easier, and of course more profitable. Prevents scoring, seizing, galling... all bugaboos in modern machining work. This trial order will start you on your way to top performance where a high pressure lubricant is needed. You will be surprised to find how long it lasts. Get yours today in both oil and grease consistencies.

TRIAL ORDER —
TWO FOUR OZ. TUBES \$1.00

Send me my order of CMD right away!
Bill me Bill my company

Name _____

Company Name _____

Address _____

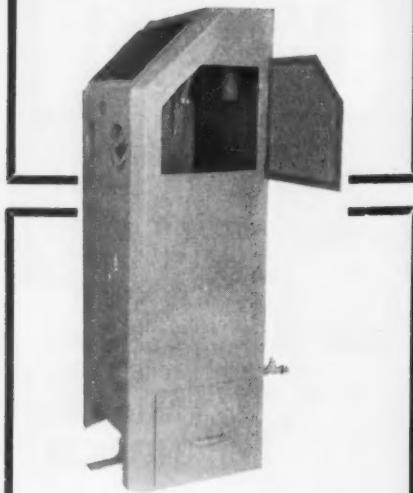
City _____ State _____

Chicago Manufacturing and Distributing Co.
1910 West 46th St., Chicago 9, Illinois

**CHICAGO MANUFACTURING
AND DISTRIBUTING CO.**

LEIMAN

SANDBLAST-CABINET TYPE



- Continuous abrasive feed. All metal cabinet. Doors on either end. Foot or automatic control. Portable ceramic nozzle uses any type abrasive. To protect the operator's hands, the two arm holes are furnished with rubber gloves.

Ideal for cleaning and finishing metals, molds, forging, plastic, etc., removing burrs, carbon, rust, grime, paint, etc., stenciling letters, monograms, trade marks, etc.

Operates on 5 to 100 lbs. or more air pressure.

Extra large viewing glass allows full vision of interior of cabinet.

Write for descriptive literature
and price list.

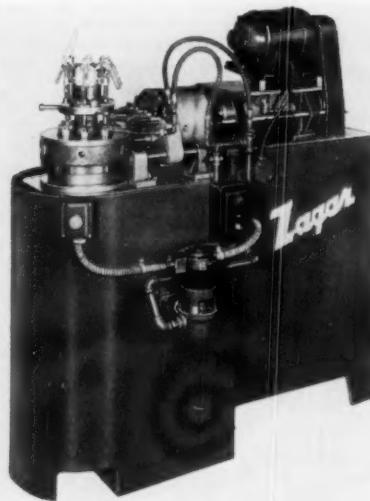
LEIMAN BROS., INC.

149 CHRISTIE ST. • NEWARK 5, N. J.

of $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch. The collet arbor is available to fit in place of a 5C collet only; however, other sizes will be released in the near future.

Special-Purpose Machine Utilizes Standard Components

A special-purpose machine which utilizes a hydraulic feed unit and a Zagar gearless drill head has been announced by Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.



Zagar Special-Purpose Machine

The feed unit has a base which serves as a table for the manually operated six-station indexing fixture. While three stations are at the drilling position, the remaining three are open for loading and unloading. The machine is built to J.I.C. standards. The feed unit and drill head are removable and can be used for other jobs with tooling changes. The feed unit has a long stroke and a maximum of $7\frac{1}{2}$ h.p. A basic tank is included with every unit. All feed units operate hydraulically.

So many standard styles . . . one must be just right for you!



For 66 years we have been producing metal-working tools and adding to our standard line. Today we have PUNCHES and DIES in a large range of round, flat, oval, and square sizes, to fit most makes of punch presses, *immediately available* from stock at regular low, standard prices.

SEND FOR OUR COMPLETE CATALOG SHEETS.

T. H. LEWTHWAITE MACHINE CO.

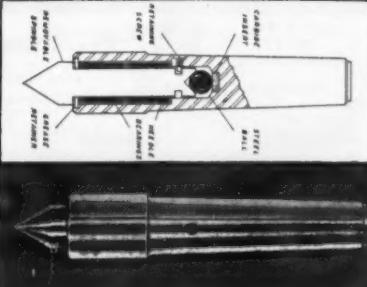
317 East 47th St., New York 17, N. Y.

**Its accuracy is built-in
WEE LIVE CENTERS**

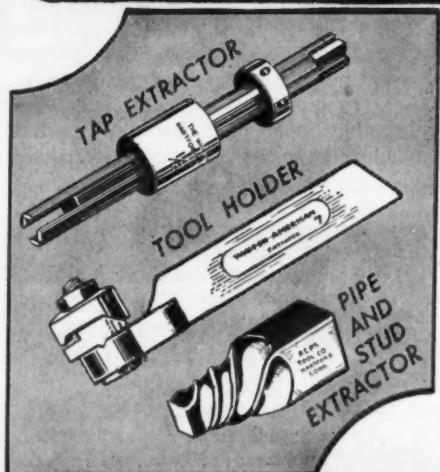
Extra capacity, needle bearings plus short overhang—30 to 40% less—makes the Wee more rigid and accurate under heavy cutting loads. Runout held to .00015. Test one—your money back if center does not prove its worth in 24-day trial. No. 3, M.T., \$24.00. Request complete price list, many sizes, tapers, shanks.

Write direct, if distributor cannot supply you.

HERBERT CROSS & SON • Bala-Cynwyd 1, Pa.



**WALTON SPECIALIZED TOOLS
CUT COSTS IN METAL WORKING**



SAVE TIME AND LABOR

When the broken pieces of taps, screws, studs, and pipes resist all ordinary methods of removal, Walton Specialized Extractor Tools will greatly aid you in keeping production moving. Especially designed for this job, these tools reduce excessive costs through savings in labor and parts salvaged. Always have them at hand in your tool crib.

Walton-American Tool Holders are also "labor savers." Four sizes will handle all tool bits and boring bars from $\frac{1}{8}$ " to $\frac{7}{16}$ ", each size adjustable to eight straight, right offset, or left offset, positions. Try a set in your shop at our expense.

Write for Walton Tools Catalog No. 10. Liberal free trial offer on all tools. Sold by leading industrial supply dealers.

THE WALTON COMPANY, Hartford 10, Conn.

Starting Finger Simplifies Marking on Round Metal Surfaces

To eliminate the difficulties encountered in the marking of names, numbers, trade marks, graduations, and so on, on round metal surfaces, Quality Die Co., 9300 S. Baltimore Ave., Chicago 17, Ill., has introduced the "Hoffmann" Starting Finger, design-

BREMIL
The IMPROVED Compound Lever Shears

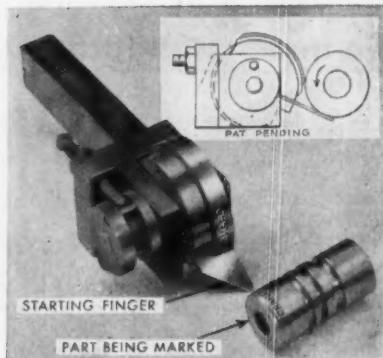
ALL ALLOY
FULLY
GUARANTEED

Two Sizes

PORTABLE

No. 1 cuts up to No. 11 gauge strip or sheet
No. 2 cuts up to $\frac{1}{8}$ " steel plate.

BREMIL MFG. CO.
1020 Holland St., Erie, Pa.



"Hoffmann" Starting Finger

ed for use with roller dies to enable oscillation of the stamp mechanism automatically as the work is being advanced to contact the die. The finger starts the movement of the die as the lathe brings the work toward it. Thus, by meeting the die and work simultaneously, scoring, chatter marks or defacing of piece parts is said to be eliminated, each character being pressed into the material with equal force.

When the marking operation is completed and the marking operation is completed and the lathe pulls the toolholder away, a tripper clicks and the die is returned to its original position. According to the manufacturer, the finger is made of spring steel, is held in place by a set screw and is adjustable to any desired position.

**HAND TAPPING
with
MACHINE
PRECISION**

Adapts for
LATHE USE

59.50
F. O. B.
FACTORY

Just slip a tap adaptor into the Dahlstrom Tap Guide and twist. Your hand tapping will be quick and accurate. For machine tapping, the spindle top is center-bored to fit the tail stock center of a lathe. Size (18" x 8" x 14"). Included 9 adaptors (8-32 to $\frac{3}{4}$ "). Taps not furnished. Write for pamphlet on tap guides, chucks and autostops.

BRANCH MFG. CO., North Branch, Minn.

Dahlstrom TAP GUIDE

EISLER CAM MILLING
JIG BORING A SPECIALIZED CAM
MILLING SERVICE...
JIG BORING...SPOT
WELDING...CON-
TRACT PRODUCTION
...EXPERIMENTAL DEVELOPMENT

EISLER ENGINEERING CO., Inc.
734 So. 13th St. Newark 3, N. J.

I'm the W.H.O.* of

WHO'S WHO

in the precision screw machine products field

Making the finest
SET SCREWS CAP SCREWS
COUPLING BOLTS
MILLED STUDS
... our specialty

**Wm H. Ottemiller Co.*

YORK, PENNA.

Ottemiller products are sold
through Mill Supply Houses and
Industrial Distributors.

Small TAPER PINS

Diameter up to .125" — Length up to 1"

Hardened and Ground

Taper Tolerance .0001" In Length Of Pin

Diameter Tolerance .0005"

Send Specifications for Quotations

COMMERCIAL
CENTERLESS
GRINDING CO.

5605 CEDAR AVE. Phone EM 1-3412 CLEVELAND 3, O.

QUADRO LIVE CENTERS

SPEED UNIT PRODUCTION
RUGGED • FRICTIONLESS • ACCURATE

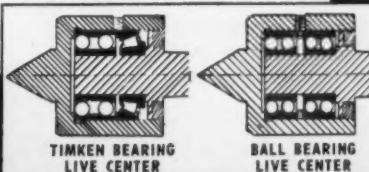
QUADRO LIVE CENTERS will take heaviest loads at highest speeds for the longest time. That's why they are specified 8 out of 10 times by factory management. On lathes, millers — any machine tool — you can count on QUADRO CENTERS for closer tolerances, fewer rejects, greatly increased production. Guaranteed!

See your Supply Dealer, or
write for full information to:

DAKON

TOOL & MACHINE CO., INC.
NEW HYDE PARK, L. I., N. Y.

"TWO DECADES OF IMPORTANT TOOL PARTS PRODUCTION"



Steel Stand for Granite Surface Plates

Collins Microflat Co., 2326 E. 8th St., Los Angeles 21, Calif., has deve-



Collins Granite Surface Plate Stand

loped a steel stand to accommodate black granite surface plates. The stand ranges in sizes from 12 x 18 in. through 72 x 144 inches. It is rigidly constructed, being made of heavy gauge angle iron reinforced to withstand from 3 to 6 times the weight of the respective surface

plates. The sizes ranging upward from 48 x 72 in. are constructed of 4 x 6 x $\frac{3}{8}$ -in. angle iron, and those sizes from 48 x 108 in. and up are supported with six legs to safely carry the heavy weight. The over-all working height of the stand is 36 inches, but it can be made at varying heights if specified. Casters or leveling screws can be furnished according to the users' needs. The stand is finished in machine tool gray.

Combination Honing Machine and Coolant Unit

Designated as the Model JCP, a pedestal-type combination honing machine and coolant unit which features spindle speeds that, without the necessity of changing belts, are variable from 400 to 1,000 r.p.m. has been announced by Superior Hone Corp., 1615 Elreno St., Elkhart, Ind. The machine has a honing range of from

NEW

ACCURATE

AUTOMATIC

Morrison **1" KEYSEATER**

\$1165.00 F.O.B. CINCINNATI, OHIO

★ AUTOMATIC FEED eliminates pushing a feed bar and insures accuracy.

★ AUTOMATIC RELIEF backs the work away from the cutter eliminating drag and insuring a clean keyseat.

★ AUTOMATIC CENTERING centers up the work quickly and easily.

★ SINGLE TOOTH CUTTERS for accurate clean keyseats and eliminating time and trouble in sharpening.

★ QUICK SET UP is one of the most important features.

Write for descriptive circular.

The D. C. MORRISON Company

P. O. BOX 1017-B • CINCINNATI 1, OHIO

How flat should YOUR SURFACE PLATES be?

This informative, FREE BOOKLET
will help you to:

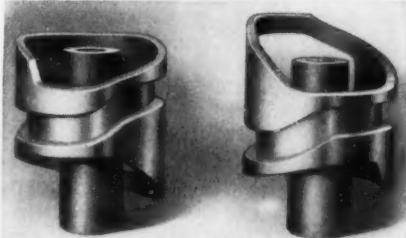
1. Determine your particular needs.
2. Buy no more accuracy than you require.
3. Get the full amount of accuracy you specify and pay for.



SEND FOR YOUR FREE COPY NOW!

RAHN GRANITE SURFACE PLATE CO.
636 North Western Ave., Dayton 7, Ohio

Rowbottom for Cams



Side and Barrel Cam... $7\frac{3}{8}$ " Diam.— $8\frac{1}{2}$ " Long
Produced by Rowbottom. Material: Steel Casting.

Cams to YOUR specifications

When you need cams, you need Rowbottom Cam Production Service. As specialists in producing all types of cams, you can depend on our rigid adherence to specifications.

THE ROWBOTTOM MACHINE CO.

WATERBURY, CONNECTICUT

Also Cam Milling and Cam Grinding Machines.
Ask for literature.

STOP WASTING DRILLS!



FREE BOOKLET . . .

shows how to prevent excessive drill breakage, vastly prolong drill life . . . and eliminate time wasted by valuable skilled mechanics grinding drills!

Black Diamond's "Positive Positioning" feature positions drill to exact twist you want . . . automatically. Now anyone can sharpen and web-thin with scientific accuracy . . . on a Black Diamond Drill Grinder!

Write

Today!

BLACK DIAMOND

Saw &
Machine Works

Natick, Mass.
71 North Ave.

Yes!...

THRIFTMASTER
makes ALL TYPES
of DRILLHEADS

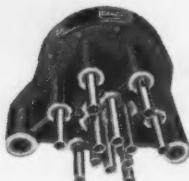
Universal Joint Drillhead . . . Full Ball or Bronze Bearing Construction. Standard and Heavy Duty. From $1\frac{1}{2}$ " Minimum Centers up. Capacities to 1" in Steel.



Gear Driven Eccentric Type Adjustable Drillhead . . . Enclosed, Full Ball Bearing Construction



Special Fixed Center Drillhead . . . Full Ball Bearing Construction.



- We Stock or Can Build the Right Drillhead for Your Job.
- Write for Complete **THRIFTMASTER** Catalog or phone for a rush, on-the-spot quote.

Subsidiary of
Thomson Industries, Inc.

THRIFTMASTER *Products Corporation*

1034 N. PLUM ST.,
LANCASTER, PENNSYLVANIA

Also Makers of
DORMAN AUTOMATIC REVERSE TAPPERS

0.185 to 2.500 inches. No adapters are required, and all mandrels are said to fit to the spindle with a bayonet lock. Mandrels or stones may be changed without using tools. All stones are ground to size. According to the manufacturer, the machine is capable of honing over keyways, spline gears and practically any broken surface. A counter-balanced foot pedal, extending from the bottom of the base, is adjustable to any desired pressure.

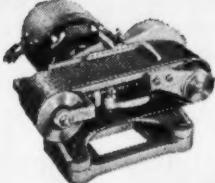


Superior Model JCP Combination Honing Machine and Coolant Unit

The coolant unit has an expandable splash tray which, to accommodate long workpieces, affords an additional 10-in. extension on the pan and keeps oil splash and mist off the floor. The hose can be flexed to aim at any point, and the nozzle is adjustable to a flow of oil that will fit the need of practically every job. The coolant unit can be quickly disassembled for easy, complete cleaning. The entire machine measures $60\frac{3}{8}$ in. high x $33\frac{3}{8}$ in. wide x 31 in. deep with the extension pan closed.

DOES IT BETTER
DOES IT FASTER

SIMPLEX-M
ABRASIVE BAND



The precision of a machine tool plus the durability of a workhorse. Complete with $\frac{1}{2}$ H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

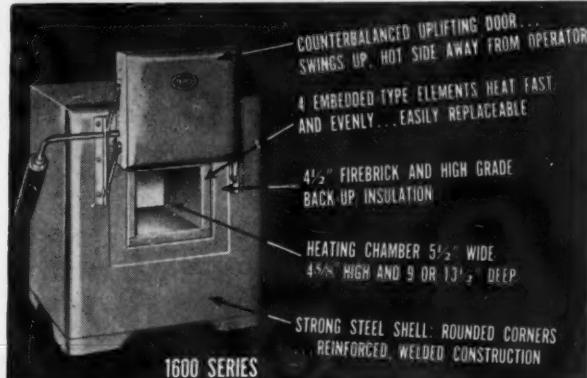
OTHER STYLES AND SIZES IN NEW
MANUAL ON FINISHING—WRITE TODAY

WALLS SALES CORP.

333 Nassau Avenue, Brooklyn 22, N.Y.

solve
heat-treat
problems

with versatile
Temco bench-
type furnace



Step up production, cut costs with Temco electric furnaces for heat treating dies, parts, tools, etc. Model illustrated above one of eight convenient sizes available with either electronic or manual temperature controls. Economical, easy to install and operate, low cost. Priced from \$55.00 to \$507.50. Write for literature and nearest dealer's name.



ELECTRIC
FURNACES

THERMO ELECTRIC MANUFACTURING CO.

•

488 HUFF ST., DUBUQUE, IOWA

KAUFMAN
TAPPING MACHINES
BUILT FOR SPECIFIC PRODUCTION JOBS



- Single or Multiple Head Operations
- Precision Depth Control
- Non-reversing Motor Drives
- Pressure Lubricated Lead Screws
- Fast, Accurate Rugged Index
- Other Head Units Available
- Other Worthwhile Features.

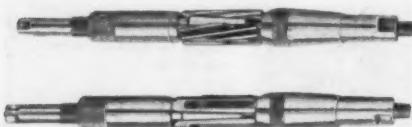
Catalogs Nos.
754 and 1153
Mailed on
Request.

Model 75-24

MANUFACTURING CO.
551 So. 29th Street,
Milwaukee, Wis.

Improved Expansion Reamer and Hone Combination

An improved expansion reamer and hone combination which utilizes a



Reasor Improved Expansion Reamer and Hone Combination

two-piece Sure-Lock sleeve and a two-piece taper bushing sleeve to end blade movement and assure perfect concentricity has been announced by Reasor Mfg. Co., St. Charles, Ill. Working together, both sleeves are said to give a solid grip on the cutting blades, control blade positively and ensure exact concentricity. According to the manufacturer, the sleeves fit closer to the reamer body and stop

blade distortion, and adjusting nuts permit easier and firmer setting. In addition, the counterbored taper bushing operates closer to blade edges and provides for truer alignment of the work.

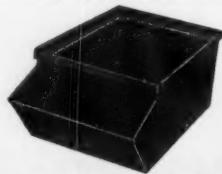
The expansion reamer and hone uses interchangeable blades, making possible one tool for both reaming and honing. The tool permits an unlimited range of size adjustments with 0.057 in. expansion in each set of blades.

Full Complement Clutch-Coupling Unit

A full complement clutch-coupling unit designed for applications where over-running features are required in conjunction with a flexible coupling has been introduced by Formspag Co., 23601 Hoover Rd., Van Dyke, Mich. According to the manufacturer, the unit is most applicable in dual



Stack Up



Sterling Bin Front "Top Rim" Steel Stacking Box. Size: 18" x 12" x 6".

THESE BOXES AGAINST ANY!

Once you use and compare Sterling stacking boxes, you'll know why we invite comparison in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box . . . no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

Write for literature and prices.

Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.



Sterling "Top Rim" Steel Stacking Box with drop handles. Size: 18" x 12" x 6".



Sterling

Quality Handling & Storage Equipment





The world's best . . . one-place, drop-forged—not welded—of mild carbon steel, heat-treated, with head accurately milled for standard tables on lathes, planers, boring mills, milling machines. Integral washer and nut. Sizes: up to 30". Typical direct prices for 10" lengths: $\frac{1}{2}$ "—\$.36; $\frac{3}{8}$ "—\$.36; $\frac{5}{8}$ "—\$.56; $\frac{3}{4}$ "—\$.89. Write for price list.

THE O K TOOL COMPANY, INC., Milford 4, N. H.

CAMS

MADE TO YOUR SPECIFICATIONS

— Except Screw Machine Cams —

Design Assistance Offered

KIDDE PRECISION TOOL CORP.

37 Farrand St. Bloomfield, N. J.

Micro
Supreme

LAY-OUT AND IDENTIFICATION DYE

7 COLORS

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

MICHIGAN CHROME & CHEMICAL COMPANY

8615 Grinnell Ave. • Detroit 13, Mich.

FLYNN

FOR 35 YEARS
THE LEADING NAME
IN BORING HEADS



15 MODELS

Flynn has studied boring head applications for many years—builds a size and design for every job with all the wanted features. Machinists with real appreciation for quality and precision prefer Flynn.

FLYNN
MANUFACTURING CO.

133 Flowerdale
Ferndale 20, Mich.

Write for our catalog



drive and alternate power applications.

The clutch-coupling unit is available in two types of construction, both within the same space limitations. One type is specifically designed to be used for low speed over-running applications and the other type is for where practically continuous high speed over-running conditions are encountered. Through the full complement construction, energized sprags

grip at an infinite number of positions. The unit is said to provide for instantaneous operation with no backlash, maximum capacity for its size and weight and long life because of low unit stresses at changing contact points.

Other features of the clutch-coupling unit include torsional resilience, which minimizes machinery stress and eliminates the vibrations set up by this shock condition; angular and

paralleled misalignment capacity, flexibility permitting severe misalignment with acceleration.

Look to Morton
FOR
Fixture Clamps
AND FIXTURE DETAILS

M-T ACORN NUT CLAMP ASSEMBLY

ACORN NUTS

CLAMP RESTS

AND BE ASSURED OF QUALITY, SERVICE AND FINE WORKMANSHIP

Widest range of types and sizes in the industry . . . Complete Clamp Assemblies or any of their Component Parts . . . Economize by using them as Standards.

MORTON MACHINE WORKS

2421 WOLCOTT STREET • DETROIT 20, MICHIGAN

★ WRITE TODAY

For Catalog of our complete line. Includes full size tracing templates of each product. Save tooling and designing costs.



Formsprag Full Complement Clutch-Coupling Unit

rated wear of the grid member, the least expensive and easiest to replace part of the package; end float, extensive in a standard coupling, but can be limited to any required degree; and lubrication, whereby both clutch and coupling have separate lubrication systems which prevent damage to both package halves in the event of leakage.



MARK OF QUALITY

STANDARD WOODRUFF KEYS

We manufacture a complete line of Woodruff keys in all standard sizes. These sizes range from as small as $1/2'' \times 1/16''$ to keys as large as $3\frac{1}{2}'' \times \frac{3}{4}''$. All keys are carefully checked for burrs, slivers, etc., before being shipped to you. Only the finished tested keys are permitted to leave our plants.



We carry a complete stock of high quality, dependable keys. Send for our catalog for complete information on Woodruff keys, taper pins, machine keys, and machine racks.

STANDARD STEEL SPECIALTY CO.

BEAVER FALLS

PENNSYLVANIA

Plants: Beaver Falls, Pa.; Hammond, Ind.

TOOLMAKERS!



Sizes:
2", 4" and 6".

NOW SET-UP FASTER--

Save time on intricate, angular set-ups with the fully universal MASTER MULTI-SWIVEL VISE. Three swivels instantly set any compound angle. Used worldwide. Interchangeable platens optional.

Write for Circular

DONOVAN MFG. CO.

80 BATTERY MARCH ST., BOSTON 10, MASS.

*A New Concept in Optical
Comparator Design...*



new
WILDER
small parts
Comparator
model C

- Vertical Design
- Erect Image
- Eye Level Screen
- Horizontal Stage

An Entirely New
Model Optical
Comparator
Designed for
100% Production
Inspection

ACCURATE - FAST
INEXPENSIVE

Promotes
Inspection Economy

If you manufacture mass produced parts that are now being inspected or should be inspected on an Optical Comparator, the new Small Parts Comparator will enable you to inspect them quickly, accurately and economically at a surprisingly low per-piece inspection cost.

Write for Folder—Code GINZE

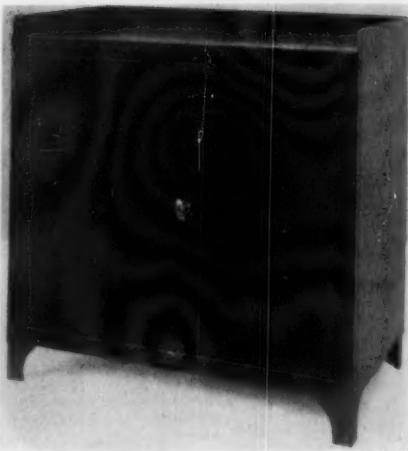
200-MM. LAFAYETTE ST. • N.Y. 12, N.Y.

Geo. SCHERR OPTICAL TOOLS, Inc.

Knock-Down Tool Cabinet Saves Space

Standard Pressed Steel Co., Jenkintown, Pa., has developed a Hallowell Knock-Down Tool Cabinet designed for use in plant tool and maintenance shops, production lines and gage rooms and in garages and hangers. The cabinet, which can be bolt-and-nut assembled in four simple operations with only a screw driver and wrench, can be stored in comparatively small space and, protected in its carton, delivered fresh and unmarred. Finished in baked-on green enamel, the unit comes in single-door and double-door models. The single-door type, with two adjustable shelves, has a working top 15 x 21 in. and is 34 in. high. The two-door style has one adjustable shelf, is 35½ in. high and comes in two top-sizes of 18¼ x 36 in. and 24 x 36 inches.

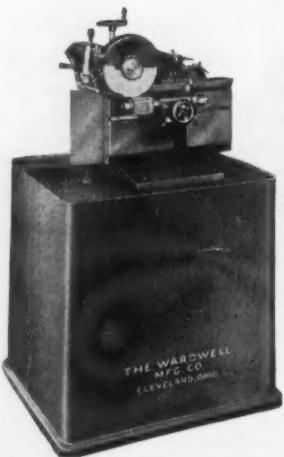
The cabinet can be furnished with detachable feet or with 3-in. steel-



Hallowell Knock-Down Tool Cabinet

tread or rubber-tread swivel casters. The full-width top has 2-in. sides and back to prevent tools from sliding off. The doors are equipped with a chrome-plated locking handle.

Automatic Circular Saw Grinder Pays for Itself Many Times Over



As many as 250 Milling Cutters, Slitting and Screw Slitting Saws .015" thick can be sharpened at one time with a variation, plus or minus .001" of exact diameter for entire lot. Automatically indexes the gang of saws, one row of teeth at a time.

Steady, Accurate, Durable Grind either wet or dry. A time and money saver.

Ask for Bulletin describing 577

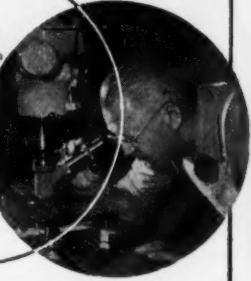


WARDWELL
MANUFACTURING CO.

3803 Ridge Rd., Cleveland 9, Ohio

Maker of Largest Line of Saw and Tool Sharpening Machines

Precise
hole location,
easy contour
inspection
with new
machine tool
microscope

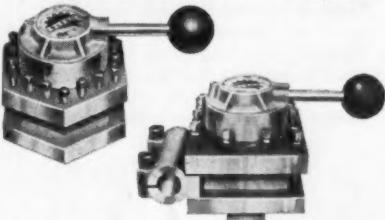


- Wide field of view (1/4"); 30x magnification
- Gages accurately to .0001—at a glance
- Mounts on offset bracket, or directly in the spindle
- Fits nearly any machine tool
- Image always appears erect and true
- Ideal for checking slots, contours, surface conditions, or transferring hole locations from template to workpiece.

Write today for complete details.

THE PERKIN-ELMER CORPORATION
Norwalk, Connecticut

"WEDGE-LOCK" TURRET



Does not raise up when indexing in all 12 positions. 4-way and 6-way block models. Repetitive accuracy to within .0003 plus or minus within itself.

WRITE FOR FOLDER

Makers of Combination Rotary Tables and Angle Plates. Also Helical Gear Speed Reducers, Single and Double Reduction. Also Special Gears of All Types.

Open territory available to representatives.

OLSON INDUSTRIAL PRODUCTS, INC.

40 W. WATER ST. • WAKEFIELD, MASS.

Stop and Shop at Rivett's production corner

DRAW-IN COLLETS

Stocked in all standard styles...checked 25 times against master gauges... guaranteed to run "dead true" at collet mouth. Write for Bulletin 100.



THREAD TOOL

No operator skill required to produce perfect threads. Duplicates threads without gauging. Mounts on any screw-cutting lathe. Write for Bulletin 110.



LOCKJAW

Set-ups stay put! Grips both downwards and sideways... eliminates bolting and clamping. Used on all table top machine tools. 2 sizes available. Write for Bulletin 140-A.



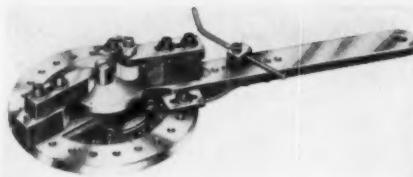
• **RIVETT** LATHE & GRINDER, INC.

Dept. MMS-11

Brighton 35, Boston Massachusetts

Metal Forming Device Is Designed for Individual Bending Jobs or Short Production Runs

Identified as the "Curvette," a hand operated metal forming device which is designed to meet the need for individual bending jobs or short production runs has been announced by Lund Products Division of Artys Sales Co., 11 Broadway, New York 4, N. Y. A roller of hardened and ground steel, with needle bearings, rolls on the outside circumference of the wire, strip, channel or tube to be formed as the hand lever is swung around the arbor. According to the manufacturer, there is no defacing of the metal surface and a smooth, contour bend is provided. The unit is said to be easy to operate and easy to reset or change over from one bending job to another. When



"Curvette" Metal Forming Device

desired, two of the devices can be used as a double bending device for two simultaneous forming operations.

The "Curvette" is designed to form basic wire up to $\frac{1}{4}$ in. in diameter and multiples of smaller sizes, strip metal up to $\frac{3}{8} \times \frac{1}{8}$ in. and thin-walled tubing up to $\frac{3}{8}$ in. in diameter. An attachment for coiling, curving and ring forming of wire and tubing is incorporated in the device.

YOU'LL LIKE
EVERYTHING
ABOUT THEM

O. B. I.
PRESS

DEEP
THROAT
PRESS

HORN
PRESS

ROUSSELLE
PRESSES

... the speed, steady output and the way they can "take it" in severe service. And... you'll be pleasantly surprised with the cost, the quality and the very low maintenance.

Rousselle presses are not ordinary, run-of-mine units. Everything about them stresses ruggedness and simplicity—precision machining—expert assembly. And they're so simple to handle and maintain—and so very

versatile. You can shear, punch, bend and form metals; cut and punch paper; form and trim fibre, plastics and other materials.

Often considerable savings are possible if you let our engineering staff assist you. No obligation. Simply explain problem and send sample or drawing of work.

Rousselle Presses are sold exclusively through leading Machinery Dealers and are Manufactured by

SERVICE MACHINE CO.

7627-33 S. Ashland Ave., Chicago 20, Ill.

New! "OLIVER"
HEAVY DUTY OSCILLATING AND TILTING
SPINDLE GRINDER

Cuts costs
for airplane
plants and
other metal
workers



Grinds difficult work accurately. Its 1-inch spindle rotates at 1800 rpm. and oscillates $1\frac{1}{2}$ " with 56 strokes a minute. Spindle tilts up to 45° toward operator, 5° away. Takes drums up to 6" diameter, 9" long. Spindle has 3" vertical adjustment to provide full use of grinding area. Write for Bulletin 381-DM.

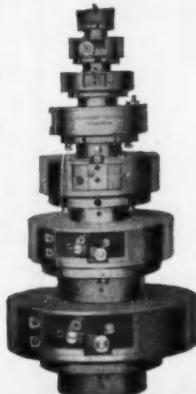
OLIVER MACHINERY COMPANY
Est. 1890 GRAND RAPIDS 2, MICH.

**MUMMERT-DIXON
FACING HEADS**

Two-way tool feed
in 9, 12, 16, 20, 24,
30, 36, 40 and 46
sizes.

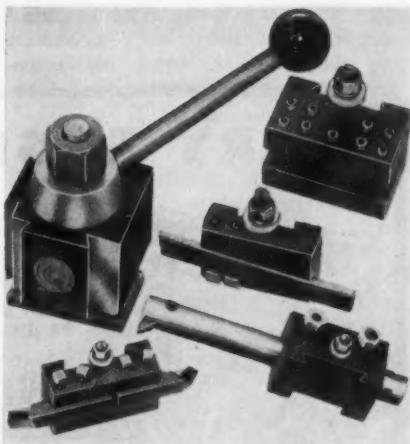
One-way tool feed
in 6, 9 and 12 sizes.
Automatic feed —
convenient tool ad-
justment — quick
feed reverse. Save
time and costly set-
ups.

Write for
folder.



MUMMERT-DIXON CO.
120 PHILADELPHIA ST. • HANOVER, PA.

GET THE MAXIMUM
from your lathes by using the
ALORIS "Quick Change"
TOOL POST



Only a second to change tools for turning,
facing, drilling, boring, reaming, cutting off
or any other operation.

- **GREAT REPETITIVE ACCURACY.**
- **RUGGED CONSTRUCTION.**
- **TESTED AND RECOMMENDED BY
LEADING LATHE MANUFACTURERS.**

Patented

Ask your dealer for a demonstration, or write
for catalog today.

Some open territory still available
for representatives.

MANUFACTURED BY
ALORIS TOOL CO., INC.
131-37 SANFORD AVENUE
FLUSHING 55, N. Y.

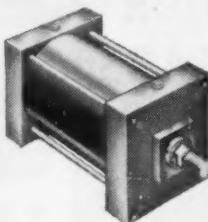
Milling Machine Features Swiveling Spindle Head

Atlas Press Co., 10-110 N. Pitcher St., Kalamazoo, Mich., has announced the Clausing Vertical Milling Machine which features a spindle head that can be swiveled in a vertical plane and set at any angle and a turret that can be rotated in a horizontal plane, making it possible to mill at all angles with one setup. The machine incorporates a heavy-duty precision drive which utilizes seven ball bear-

ings. The ground spindle is hard-chrome plated; the quill is ground, hard-chrome plated and has full length honed bearing in the head; and the ground overarm is an electric furnace casting with $\frac{3}{4}$ -in. thick walls. The quill has a micrometer depth control stop and two feeds, lever and hand-wheel. All feed screws have ground threads, turn on ball bearings and have large micrometer dials. The machine is said to be capable of handling both small and large cutters with equal efficiency. Table surfaces and all dovetail ways are precision ground, and the ways have

EVERY ENGINEER

will want
a copy of
this
BULLETIN



WRITE FOR BULLETIN 213. Complete details and mounting dimensions on Hannifin Series "A" Square Type Fluid Power Cylinders, usable up to 200 psi, air or oil. This is the cylinder with the new, externally removable cartridge gland...the biggest improvement in cylinder design in the last 50 years. The "A" line is complete! 11 bore sizes from $1\frac{1}{2}$ " to 14" - 13 standard mountings, many combinations. Steel heads. Brass bodies. Piston rods ground, polished and hard chrome plated. Send for Bulletin 213. It's the easiest catalog to use in the cylinder business.



Clausing Vertical
Milling Machine

gibs for accuracy.

The machine utilizes a 6 x 24-in. table which has a 15-in. longitudinal and 5-in. transverse travel. The machine has a 12-in. vertical knee travel, 3-in. quill travel, six

HANNIFIN

Hannifin Corporation, 535 S. Wolf Road, Des Plaines, Ill.
Air and Hydraulic Cylinders • Presses • Air Control Valves

spindle speeds, and a maximum distance of $8\frac{1}{4}$ in. from the spindle to the column and operates from either a $\frac{1}{2}$ or $\frac{3}{4}$ -h.p. motor.

Lightweight Cutting Torch Has Heavy Cutting Capacity

Smith Welding Equipment Corp., Dept. MMS-121, 2633 Fourth St., S.E., Minneapolis 14, Minn., has announced a lightweight cutting torch which has a heavy cutting capacity. The torch utilizes hard drawn, pure copper cutting tips, of the "slip-in" design, which have protected replaceable seats. The torch handle may be rotated to accommodate a cutting jet lever in either under-handle or over-handle position. A trigger may also be installed in the under-handle location. The cutting valve seat, it is claimed, can be easily replaced without dismantling the torch.

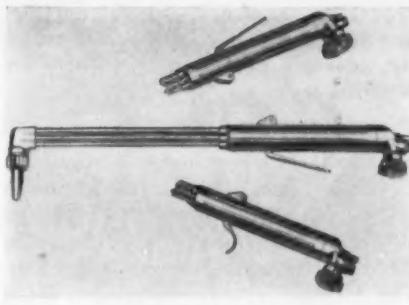
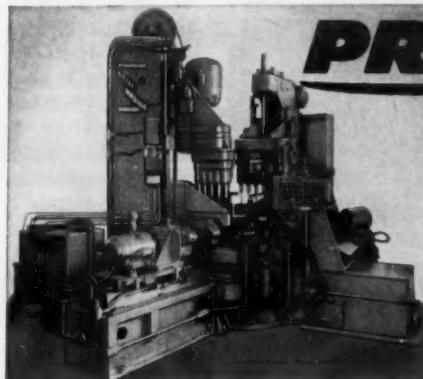


Illustration showing Smith Lightweight Cutting Torch, including various available handle arrangements

The cutting torch is available in head angles of 75 and 90 degrees. Two and three-hose models for use in all popular makes of automatic cutting machines are also available. The slip-in tips are seated in the torch head with hand pressure on the tip nut. No



STANDARD'S S.O. 3515

Proficient engineering makes this STANDARD machine outstanding in the automotive industry.

This 7-Station machine produces automotive valve rocker arms. It is equipped with 2-Standard hydraulic DRILLMASTERS, 2-way type drilling units and a 48-inch hydraulic Index Table complete with 7 fixtures holding 4 parts at each station.

At Station 6 is a 4-spindle Tapping Head and at Station 7 an air operated ejection unit. Clamping is hydraulically actuated at the loading station, unclamping is by means of a cam.

The Hydraulics and Electrics are J.I.C. standards. John S. Barnes hydraulics are used. Production is 646 pieces per hour net.

WRITE FOR COMPLETE TECHNICAL INFORMATION.

UNITED STATES SALES REPRESENTATIVES: ARNOLD J. WERNER CO., NEW CENTER BUILDING, DETROIT 2, MICHIGAN



**STANDARD
MACHINE AND
TOOL CO., LTD.
WINDSOR, ONTARIO**

wrench is necessary. Special cutting tips designed for gouging, rivet burning, scarfing, and so on, can also be supplied.

Electrode Is Designed for Welding High Tensile Strength Joints

Designated as "Jetweld" 2 HT, an electrode for welding high tensile strength joints has been announced by The Lincoln Electric Co., Dept. 3605,

Cleveland 17, Ohio. The electrode contains iron powder in the coating which is said to give it the advantages of speed and performance. According to the manufacturer, the electrode represents another addition to the company's line of iron powder electrodes for making specified types of joints.

Jetweld 2 HT is especially designed for high speed welding of flat fillet and deep groove joints where high tensile strength and low crack sensitivity are required. It is claimed to have unusually easy slag removal, good physical properties and smooth appearance.

The electrode operates on either a.c. or d.c., with a.c. operation preferred. The bead, it is claimed, has excellent wash-in, and slag removal is also good. Spatter is said to be reduced to a minimum, and the smooth appearance on cover pass welds meets automatic welding standards. The properties of the electrode are said to make it ideal for work requiring high tensile strength and for X-ray work. Jetweld 2 HT is classified as E-7020 and is available in 7/32 in. diameter.

BRAND NEW

ANGULAR-BASE

TOGGLE CLAMP



with low silhouette
the fixture-hugger
that makes it far
easier to insert and
remove work . . .

and complete clearance
of working area due
to flop-over holding
bar—ideal for
positioning metal
or plastic sheets!

Send for
FREE CATALOG
on the new
De-Sta-Co
Models 507 and 509

DETROIT STAMPING COMPANY
World's FIRST Line of TOGGLE CLAMPS
349 Midland Avenue • Detroit 3, Michigan

Semi-Automatic Loader Increases Production Rate of Gear Shaver

An air - powered semi - automatic loading device which is designed to offer a low cost method of increasing production rates of standard Red Ring rotary gear shaving machines has been introduced by National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich. Increase in production rates with the loader is said to be accomplished by providing tailstock and splash door air cylinder controls, suitable electrical controls and a special work locator designed to suit the particular gear or gears whose teeth are to be finished.

With the semi-automatic loading device, the operator merely places the gear in mesh with the cutter and rests the gear on the approximate locator, presses the cycle start button and removes the gear at the completion of the tooth shaving cycle. When the work has been positioned on the



Red Ring rotary gear shaving machine equipped with a semi automatic loading device.

approximate locator and the cycle start button is pressed, the splash guard door cylinder closes the door, the tailstock air cylinder advances the tailstock, the coolant is turned on and the cutter starts to rotate in mesh with the gear. When the shaving cycle is completed, during which the work is fed back and forth across the

APEX INSERTED-BLADE METAL-CUTTING TOOLS

"APEX" Heavy-Duty Cutters In Stock

We carry stock cutters for face milling, slotting or straddle milling. Your inquiries invited.

"APEX" manufactures inserted tools and milling cutters of all styles. Carbide-tipped cutters furnished when required.



APEX TOOL & CUTTER CO., Inc., Shelton 15, Conn.

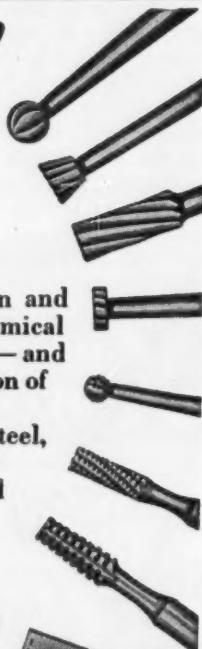
cutter while being simultaneously fed to depth, the cutter drive motor is plugged to a stop. The coolant is shut off and the splash door opens. Following this, the tailstock retracts and the operator can remove the gear from the cutting area.

Polishing-Buffing Head Has 4-Inch "Float" Action

Designated as the Model 50-99, a polishing-buffing head and stand unit

designed for medium-duty polishing or buffing operations has been announced by Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich. The head has a maximum "float" action of 4 in., allowing it to follow the surface of irregular parts. Flat surfaces can also be finished without using the floating action. The head can be powered by either a 3, 5 or 7½-h.p., 1,750-r.p.m. motor or a 10-h.p. 3,500-r.p.m. motor. Power wheel feed can be furnished, which will enable the machine operator to maintain correct pressure, thus assuring uniform re-

Your Best Buy
in Burs!



S.S. WHITE BURS cut fast, clean and cool and give long-lasting economical service. Cutting edges are keen — and stay sharp. There's a full selection of sizes and shapes of steel, and carbide burs for cutting brass, steel, wood, hard rubber, bone or any other material that can be bored or milled by sharp-edged hardened steel tools.

WRITE TODAY for 50-page Catalog T-51

It completely describes the full line of S.S. White flexible shaft tools and other industrial products.

THE *S.S. White* INDUSTRIAL DIVISION
DENTAL MFG. CO.



Dept. 55, 10 East 40th St.
NEW YORK 16, N. Y.

WESTERN DISTRICT OFFICE: Times Building, Long Beach, California



Hammond Model 50-99 Polishing-Buffing Head and Stand Unit

sults. The machine is also equipped with an ammeter as standard equipment. Periodic reading of the ammeter is said to take the guess-work out of the work the head is performing. The unit weighs over 1,400 pounds.

Special Adjustable-Torque Driver Is Designed for Lead Screw Tapping

A special releasing driver which is said to be capable of reducing tap breakage and which is designed with a spring-loaded shank to accommodate lead screw tapping has been announced by Scully-Jones and Co., 1909 S. Rockwell St., Chicago 8, Ill. According to the manufacturer, the adjustable-torque clutch mechanism operates on a "safe-torque" principle, a method that affords complete release and eliminates objectionable friction, heat, wear and impact action. There are said to be no slipping friction surfaces or overriding teeth in the design. A roller drive provides free-wheeling releasing action, protects threads and prevents changes in torque settings due to friction and heat.

The driver, it is claimed, may be preset to release when machining tor-



Scully-Jones Special Adjustable-Torque Driver

que approaches the strength limits of the tap under required operating conditions. A special spring-loaded shank compensates for variations between feed of spindle and lead of tap.

Cabinet Controls Relative Humidity At Any Point from 50 to 99 Per Cent

A controlled relative humidity cabinet with relative humidity controllable at any point from 50 to 99 per cent and a dry bulb temperature range from ambient to plus 70 deg. C. has been announced by Blue M Electric Co., 306 W. 69th St., Chicago 21, Ill. High humidity without condensa-

Air Operated Rotary Work Feeder

Deftly holds and delivers small parts to drill, tap, swage, stake, etc. Stations accurate to .002". Guaranteed against over-travel or "skipping." Indexes as slow or fast as you like, up to 10,000 per hour. Compact and sturdy, easy to tool and hook up.

Standard dial plate 10"; available in 12". For a new job, simply tool up a new dial. Readily combines with "MEADMATIC" Timer, Air Hammer, Air Press, Drill Presses, etc. — to make almost completely automatic machine—operator merely loads.



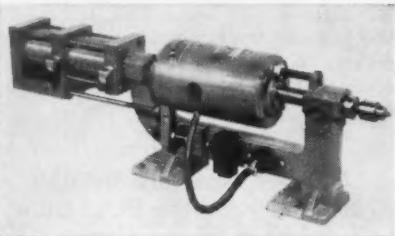
Write
for
full
details.



MEAD
SPECIALTIES COMPANY

4114 No. Knox Ave., Dept. AA-114, CHICAGO 41, ILLINOIS

ANNOUNCING
NEW IMPROVED
IN-LINE AUTOMATIC DRILL UNIT
by ELECTRO-MECHANO Co.



Model 111 Base Mounting

In 1947, E-M introduced its first semi-automatic production drill unit. Thousands have successfully been used to solve simple and complex drilling jobs, etc. Now E-M proudly presents a New Line of compact self-contained air feed variable spindle speed drill heads featuring: IN-LINE design of pneumatic feed, hydraulic control, electric motor and spindle. All side pull on spindle has been eliminated. Air and oil are separate; oil sealed in closed circuit. Push-Button or automatic electric control—Rapid advance to work—Adjustable feed thru work—Automatic return and cycling.

Write for Literature and Name of Nearest Dealer

Model 110 with Valve and Relay

CAPACITY
.004"—.156"

STROKE
1 1/2"
R. P. M.
1000—10,000
2500—15,000

PRICES
Ready to Drill:

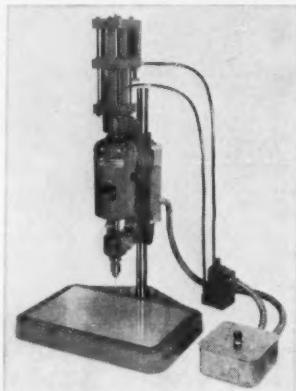
COLUMN
MOUNT

\$292.50

PAD MOUNT

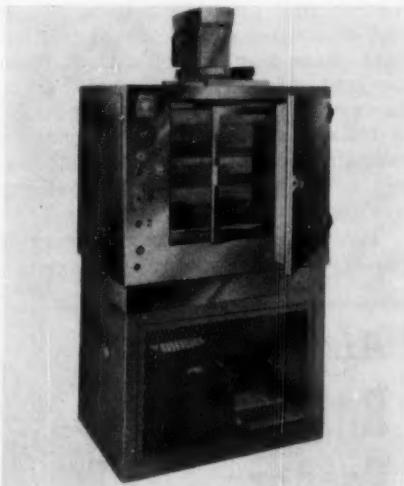
\$310.00

VALVE-RELAY
\$38.00



The ELECTRO-MECHANO Co.
265 E. Erie St., Milwaukee 2, Wis.

tion on test specimens is said to be provided by a counterflow air baffle, cooling coil arrangement. Extended surface cooling coil and solenoid valve are standard equipment for the circulation of tap water. The cabinet, it is claimed, allows automatic operation at ambient, slightly below ambient and up to 70 deg. C. with fine control of humidity. The amount of water circulated is less than 5 gal. per day. A built-in feature of the cabinet is a Modella tubular heater



Blue M Counterflow Controlled Relative Humidity Cabinet

and auxiliary switch which, when used, permits a saturated relative humidity. The cabinet may be drained and used as a dry-type incubator.

Relative humidity is said to be controlled within plus or minus 2 per cent at any point, and the dry bulb temperature is accurate to plus or minus 1 deg. C. Wet and dry bulb temperatures are individually controlled by an automatic hydraulic thermostat. A power selector switch on the dry bulb heater permits the selection of wattage in relation to tem-

perature and work load. A low velocity alloy multi-bladed turbo-type blower mounted at the top of the cabinet maintains uniform vertical air flow type convection. The cabinet is available in four models with capacities ranging from 1.4 to 10.0 cu. ft., and 115-volt 60-cycle a.c. operation is standard. Other features include stainless steel construction inside and out, inner glass observation door, alloy pressure-type latches, automatic constant water level feeder and wet and dry thermometers.

Heavy-Duty Sander Has Full Load Speed of 5,500 R.P.M.

Designated as the No. 1500 Speed Sander, a heavy-duty, orbital-motion sander featuring a full load speed of 5,500 r.p.m. and a 4½ x 9-in. sanding area has been announced by the Speedway Mfg. Division of Thor Power Tool Co., Aurora, Illinois.



Thor No. 1500 SpeedSander in use

Designed for powerful, high-speed sanding work in automotive, industrial, trade craft, and "do-it-yourself" markets, the No. 1500 has been introduced as a companion model to the smaller No. 150 SpeedSander. The sander weighs 7½ lb., and has an overall length of 11 inches. It offers all ball bearing, direct connected, air cooled motor, with easy handling and fast abrasive pad changing.

Commander **LEAD-MATIC**
Tapper

Automatic Tapper with Lead Screw
FOR HIGH PRODUCTION PRECISION TAPPING

• Precision Ground Lead Screws Assure Finest Threads
• Electrically Controlled Cycle or Jog Tapping Action
• Hand, Foot or Fixture Switch Control
• Easily Adapted to Any Drill Press
• Range #0 to ¾"

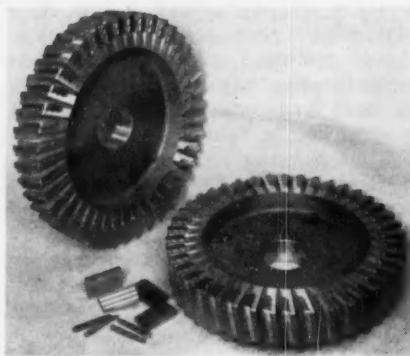
Built for high production tapping . . . precision or otherwise, the Commander Lead-Matic Tapper makes any drill press a precision tapping unit, even with inexperienced operators. Electric control of Cycle or Jog tapping action provides versatility to handle any job . . . automatic tap reversal eliminates drill press motor reversing and speeds tapping. Compact, ruggedly built, easy to operate, the Commander Lead-Matic Tapper will cut your tapping costs and reduce rejects to a minimum.

Write for illustrated circular and name of nearest Distributor.

Commander MFG. CO.
4224 W. KINZIE ST. • CHICAGO
PRODUCT OF COMMANDER . . . BUILDER OF PRODUCTION TOOLS

**Cutter Mills Cast Iron at 100
Inches Per Minute**

Designated as the 7200 Series, an inserted blade milling cutter which is said to be capable of feeds in excess of 100 in. per minute and employing four blades per inch of diameter has been announced by Wesson Co., 1220 Woodward Heights Blvd., Detroit 20, Mich. Designed for high feed, cast iron finishing, the cutter consists of a hardened steel body with broached



Wesson 7200 Series Inserted Blade Milling Cutters



- Adjustable Vee Block Grip
- Full Length Tool Contact
- Powerful Clamping Force
- No Harmonic Vibration
- No Chatter
- Grips Round, Square, Rectangular and Cut-Off Tool Bits
- One Holder Handles Many Bit Sizes
- Carbide Models Also Accommodate Boring Bars
- Tilted Head Improves Vision

SPECIFICATIONS

Specify Right or Left Hand Offset!

FOR CARBIDES (No Rake)	Model P60	P61	P62	P64
FOR HIGH SPEED STEEL (15° Rake)	Model 60	61	62	64
SIZE:	0	1	2	4
TOOL CAPACITY	1/8" 5/16"	3/16" to 3/8"	1/4" to 1/2"	5/16" to 5/8"

Order from your dealer—Ask for Clark!

ROBERT H. CLARK COMPANY
9330 Santa Monica Blvd., Beverly Hills, Calif.

blade slots, Wessonmetal carbide-tipped blades and hardened steel wedges. The wedge, applied beneath the blade, raises it, causing the blade and body serrations or grooves to lock against each other for positive, firm positioning. The blade is over 1 in. high with large steps or grooves, making four blades per inch possible. The cutter is available in diameters ranging from 6 to 20 inches.

**Broaching Machine Can Be Used
in Both Horizontal and
Vertical Positions**

Colonial Broach Co., Box 37, Harper Station, Detroit 13, Mich., has developed a horizontal-vertical broaching machine, identified as the Colonial

DO IT WITH ATLANTIC GEARS

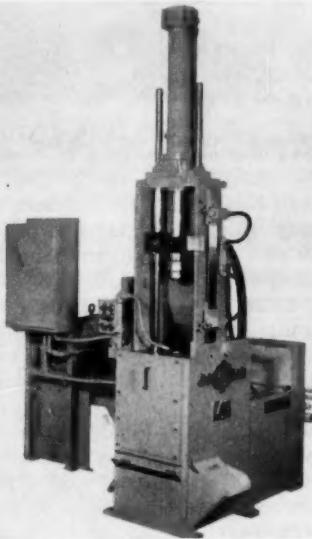
SPUR • SPIRAL • WORM • BEVEL GEARS
GENERATED WITH PRECISION
ON MODERN EQUIPMENT

Send SAMPLE or
BLUEPRINT for QUOTATION

Complete Illustrated
Brochure on Request

Call Canal 6-1440 ATLANTIC GEAR WORKS, Inc.
200-MM Lafayette Street • New York 12, N.Y.

"4," which is capable of performing four different basic broaching or press operations. The machine, it is claimed, will handle push and pull-down broaching, as well as press operations, in the vertical position, and in the horizontal position it provides all of the well-known advantages of horizontal broaching. Horizontal and vertical positions of the working bed are assumed by pivoting the bed section about the top of the base by means



Colonial "4" Horizontal-Vertical Broaching Machine in the vertical position

of a hydraulic lift cylinder. In the horizontal position, a chip pan containing the guide support is attached to the base.

Power for the lift cylinder is supplied by a hydraulic pump and motor unit mounted on a separate base that also houses the hydraulic fluid. This power unit may also be used as an auxiliary hydraulic take-off for other uses.

The coolant pump and reservoir are housed in the main base. Both the

**Save
up to
30%**



Heavy Duty Bench Grinder



**cost
less
to own
and
operate**

Queen City

grinders and buffers

So good they're guaranteed: "try one for 30 days . . . if you're not satisfied, return it." It makes cents . . . and dollars . . . to buy equipment like that at prices 20 to 30% under competing makes!

The complete range of Queen City Grinders and Buffers . . . floor and bench types . . . is described in newly-revised literature.

WRITE FOR FREE CATALOG TODAY!

QUEEN CITY MACHINE TOOL CO.
3911 Kellogg Avenue, Cincinnati 26, Ohio
"High Quality—Low Cost—For over 50 Years"

base and working bed sections are weldments. Integral with the pivoting bed section is the table for supporting work-holding fixtures. The machine requires a floor space of 84 x 40 in. and has a rated capacity of 8 tons in the vertical position. In the horizontal position, a 132 x 40-in. space is required, and the machine has a rated capacity of 6 tons. In this position, the height to the center line of the broach is 44 inches.



**DRILL and
PILOT
BUSHINGS**
**Frictionless
—Rotary**

For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch.

Write for details.

GATCO ROTARY BUSHING CO.
42330 Ann Arbor Road, Plymouth, Michigan

The "UTILITY"



MARKING OUTFIT

Nine sizes of type stamped with the same holder—furnished in sturdy wooden box—for all interchangeable marking.

Write for Catalog 100

Mecco
SAFETY
MARKING TOOLS

M.E. CUNNINGHAM CO.

1051 CHATEAU STREET, PITTSBURGH 33, PA.

Material Clamping Device for Di-Acro Benders

Designated as the Di-Acro Quik-Lok, a clamp designed for use on both

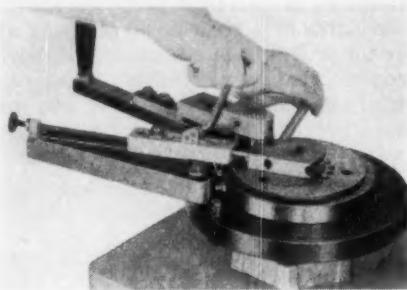


Illustration showing Di-Acro Quik-Lok Clamp being used on Di-Acro No. 1A Bender

Di-Acro Nos. 1 and 1A Benders when forming tubing, angle, channel and extrusions has been announced by O'Neil-Irwin Mfg. Co., 576 Eighth Ave., Lake City, Minn. The material clamping device locks the material securely in position and can be instantly released to remove the formed part.

The unit, it is claimed, can be easily adjusted for any radius to 2 in. on the No. 1 model and 6 in. on the No. 1A model, and will handle stainless steel tubing up to $\frac{1}{2}$ in. in diameter and round steel bar up to $\frac{5}{8}$ in., as well as many other types of material within the capacity of the

STOP DUST

DUSTKOPS 22 MODELS

UNIT TYPE 300 cfm to 10,000 cfm

LOW COST $\frac{1}{4}$ hp to 15 hp

AVAILABLE FROM STOCK

For: Grinders, buffers, polishers, wood-working, lint . . . ALL DUSTS.

Describe problem for recommendation
by return mail, without obligation.

A GET-DETROIT CO.

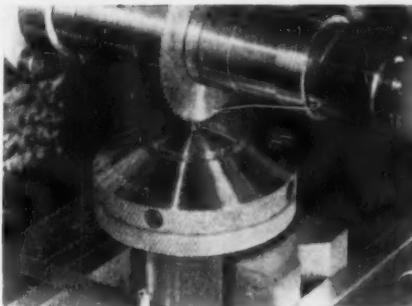
207 Main St.

Ann Arbor, Mich.

No. 1 and 1A benders. One tube clamp block of specified diameter is included as standard equipment with each Quik-Lok Clamp. Additional clamp blocks for other types of forming operations are also available.

Collet Chuck Is Designed to Reduce Set-Up Time

Identified as the "Chuckollet," a collet chuck which is designed to reduce shop set-up time and minimize the need for special tooling has been announced by Hancock Mfg. Co., Inc., Santa Clara, Calif. The chuck is built of nickel-molybdenum steel, hardened inside and out. It is said to be so constructed that it cannot dislocate the workpiece as the collet is not drawn in while closing. The chuck accommodates a standard 5C collet and is designed for use on lathes, milling machines, drill presses, dividing heads, super spacers, surface grinding ma-



Hancock "Chuckollet" Collet Chuck in use

chines, cylindrical grinders and 2, 3, 4 and 6-jaw chucks, or can be set in a vise at any angle.

According to the manufacturer, the collet chuck can hold soft threaded parts and thin walled cylindrical parts without damage while machining. The chuck is furnished with an adjustable internal stop which is claimed to positively locate workpieces axially.



MONEY-BACK TRIAL OFFER
Order a trial gallon of each today for testing in your shop. We'll cancel the bill if you're not satisfied.

cut weld cleaning time by 85%

Throw away your cold chisel and whisk off weld spatter with a dry rag! Protect-O-Metal spatter-proofing compounds make weld cleaning a breeze. Improve your welds at the same time . . . P-O-M compounds quiet the arc, improve fusion and electrode operation, prevent oxidation and annealing scale, cause no porosity. No smoke, odors, or fumes.

P-O-M No. 2. Non-inflammable, non-toxic, water-soluble paste. Inorganic. Thin before applying and start welding at once. \$3.25 per gallon, f.o.b. Dayton.

P-O-M No. 8. Rust- and corrosion-resistant resin base compound. Comes ready to use. Safe for all metals. Good paint primer; permits outdoor storage of subassemblies. \$3.30 per gallon, f.o.b. Dayton.

PROTECT-O-METAL
G. W. SMITH & SONS, INC.
5407 KEMP ROAD, DAYTON, OHIO

Unit Shuts Down Machine When Tools Need Changing

To reduce tool costs, decrease sharpening expense and increase machine efficiency, The Cross Co., Dept. 20P, Detroit 7, Mich., has announced a tool control unit which can be furnished for all types of metalworking equipment, including screw machines, drill presses, gear hobbers, punch presses, gear shavers and milling machines.



Cross Tool Control Unit

YOU CAN RELY ON CONANT BROACHING TOOLS and BROACHING FIXTURES

Conant offers complete engineering and manufacturing facilities for your broaching needs. Expertly designed for proper strength and chip carrying capacity. Prompt broach sharpening and reconditioning service. Order standard keyway broaches from our stock.

Your inquiry invited. Send us part prints for recommendation and quotation.

CONANT BROACH CO.

347 W. 107th St., Chicago 28, Ill.

Take the
GLARE out of
Micrometer
Reading

with the
"Lustro-Chrome" MICROMETER

MEASURE TO 1/10,000th

All graduations are well-defined black lines on dul chrome surface for easier and surer reading, even in poor light. Guaranteed accurate within one half of a ten thousandth of an inch.

Drop-forged model with chrome finished micrometer head, from \$8.25 up.

Ask for Micrometer Catalog



No. 901 C
0-1" Size
with LOCK NUT and
RATCHET and 10th
vernier
as shown
\$13.25

This tool with
TUNGSTEN CARBIDE
tipped **\$15.75**
anvils

GEO. SCHERR CO., INC.

200-MM LAFAYETTE STREET • NEW YORK 12, N.Y.

grouping of tool changes, it is claimed, reduces downtime and increases production.

Independent Operator's Platform Developed for G&L Tracer Machine

Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., has announced an independent operator's platform which is designed for use on the G&L



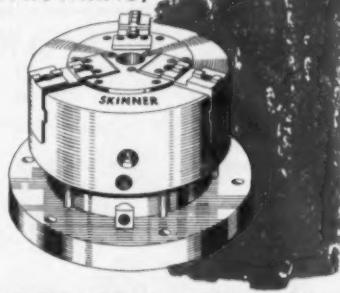
Giddings & Lewis 50 Series FUAR Tracer Machine equipped with independent operator's platform

50 Series FUAR Tracer Machine. Operating separately from the headstock of the machine, the unique "elevator" arrangement is said to permit the operator to change his position to any height on the huge column without disturbing the spindle or stylus setting.

According to the manufacturer, the independent platform enables the operator to return to the floor level for tools and other equipment quickly and safely without climbing up and down the column ladder.

NEW SKINNER POWER CHUCK FIXTURE

(NON-ROTATING)



**POWERFUL! ACCURATE!
FAST! DURABLE!**

Close coupling makes this Skinner Power Chuck Fixture the lowest, most compact unit of its type! Air-operated, it can be used on drilling, milling and transfer machines, and for assembly operations.

Special wedge action provides tremendous gripping power. Self-centering, self-locking. Available in 8", 10" or 12" dia., with 2 or 3 jaws. Operable with either a Skinner hand valve or a 4-way solenoid or foot valve. $\frac{3}{8}$ " pipe connections. Max. air pressure: 100 lbs.

Write for Bulletin PCF 67

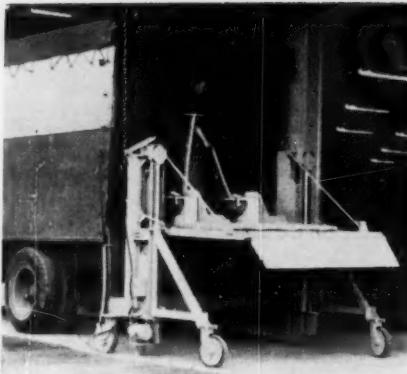
THE CREST  OF QUALITY

**THE SKINNER
CHUCK COMPANY**

210 Edgewood Avenue, New Britain, Conn.

Portable Loading Dock Has Capacity of 6,000 Pounds

The Raymond Corp., 88-126 Madison St., Greene, N. Y., has announced a portable loading dock which is said to eliminate the need for permanent loading platforms, truck wells or elevators. The unit is said to have a capacity of 6,000 lb. and can be rolled by two men right up to the tailgate of over-the-road trucks. The loading dock utilizes a hydraulic elevating mechanism which is designed to raise



Raymond Portable Loading Dock in use

"PAK - N - STAK"

COPYRIGHT

*The most economical LEAKPROOF,
LIGHTWEIGHT, DRAWN TOTE PAN offered to industry*

OUTSIDE DIMENSIONS

DEEP — 5 $\frac{1}{2}$ "
LONG — 18 $\frac{1}{4}$ "
WIDE — 10 $\frac{5}{16}$ "



There Are 25 Nested Tote Pans in Above Photo

WRITE FOR CATALOG AND PRICE

BATHEY MFG. CO.

100 SO. MILL ST.

PLYMOUTH, MICH.

loads up to a maximum height of 56 inches. The elevating mechanism can be either battery or a.c. powered. Because of its portability, the unit, it is claimed, can be used for loading or unloading either inside or outside the plant. The dock folds up for storage purposes, thus occupying little floor space when not in use.

Magnetic Base Features Universal Indicator Holder

Identified as the No. 4, a magnetic indicator base featuring a universal indicator holder which is designed to fit practically any of the test or dial type indicators has been announced by Superior Indicator Co., P.O. Box 734, Rochester 3, N. Y. The unit con-

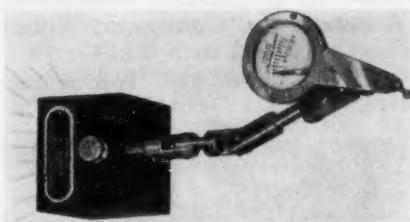


USE Tamms FULLER'S EARTH

Adds greatly to the safety of your shop • Provides safe non-slip footing • Absorbs oil and grease • Lessens fire hazard because, unlike saw dust or wood shavings, it is non-inflammable • Every shop needs this low cost safety aid.

A trial will convince you. Send for FREE SAMPLE.

TAMMS INDUSTRIES, INC. 228 N. LA SALLE ST., CHICAGO 1, ILL



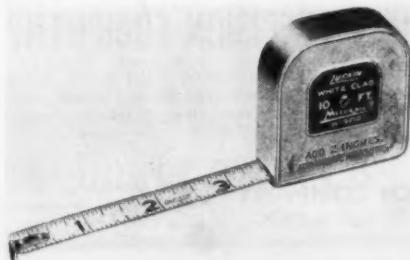
Superior Magnetic Base and Detachable Indicator Holder

sists of a powerful permanent-type Alnico magnet (40-lb. pull) assembled in a 1½-in. cube of aluminum and a unique three-piece universal indicator holder which permits adjusting of the indicator into any position. The indicator holder is detachable and can be used separately in any chuck or revolving spindle. The center part of the three-piece holder is non-magnetic.

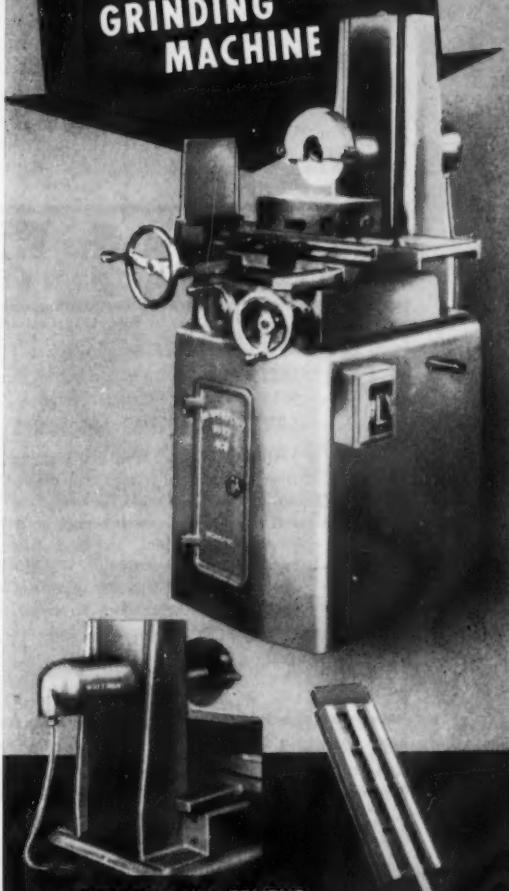
Tape Rule Features White Blade with Bold Black Graduations

Identified as the White Clad Mezurall, a tape rule which features a white blade has been introduced by The Lufkin Rule Co., Saginaw, Mich. The blade is finished in white with bold black figures and black graduations, coated with a clear abrasion-resistant plastic to resist wear. The rule has a self-adjusting end hook which is said to assure accurate hook-over and butt-

Lufkin White Clad Mezurall Tape Rule



New 6" x 16"
**BRIDGEPORT
SURF-ACE
GRINDING
MACHINE**



- PRECISION IN TENTHS
- V and FLAT BEDWAYS
- MOTORIZED SPINDLE
- CAST IRON CONSTRUCTION
- HAND SCRAPED
- CONVENIENT WHEEL LOCATIONS
- PRE-WAR PRICED

**BRIDGEPORT SURF-ACE GRINDING
MACHINE COMPANY**

Write for Illustrated Bulletin

315 ASYLUM ST.

BRIDGEPORT, CONN.

end measurements. Graduations are in consecutive inches to 16ths on both edges, and the first 6 inches of the upper edge is graduated to 32nds. The tape rule also features a light, strong case made of die cast magnesium alloy with a non-glaring satin chrome finish. The unit is packaged in a two color, plastic, re-usable box with a transparent, hinged lid and snap fastener. The rule is furnished in four lengths; namely, 6, 8, 10 and 12 foot.

SAVAGE NIBBLING MACHINES



SPECIAL
TOOLS AND
DIES FOR
SAVAGE NIBBLING MACHINES

SAVAGE TYPE "S" Tools and Dies are made from a high carbon, high cobalt, special high speed steel. The life of the tool is increased many times, which means less sharpening, less down time and increased production. PATENTED SAVAGE Tool Holder permits adjustment of tool for length, which makes possible repeated sharpening of tool.

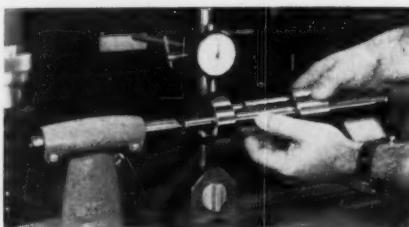
Quotation on Request
"NIBBLE YOUR COSTS"

W. J. SAVAGE COMPANY
Knoxville Since 1885 Tennessee

PIONEER MFRS. OF NIBBLING MACHINES

Universal Expanding Mandrel Is Accurate and Concentric Within 0.0002 Inch T.I.R.

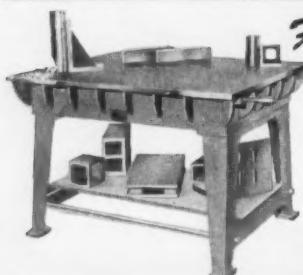
The Le Count Tool Works, Inc., 390 Capitol Ave., Hartford, Conn., has



Le Count Type "S" Super Count-Centric Universal Expanding Mandrel in use

announced the Type "S" Super Count-Centric Universal Expanding Mandrel which is said to have an accuracy and concentricity within 0.0002 in. total indicator reading. According to the manufacturer, the Type "S" is similar to the Type "A," containing all of the construction features of the earlier model. Unusual accuracy, it is claimed, is obtained by hand lapping the vital components of the tool. The mandrel is available in 11 sizes for accommodating all size arbors from $\frac{3}{8}$ through 7 inches.

The mandrel is said to be particularly adapted to finish grinding, super-finishing, inspecting and other operations requiring accuracy. The tool is also suited for maintenance work.



For ACCURATE MEASURING You Need MILWAUKEE PRECISION EQUIPMENT

- Surface Plates
- Angles
- Parallels
- Straight Edges

Performance-proved by over 40 years of specialized experience...Made from top-quality semi-steel, finished to exact dimensions.

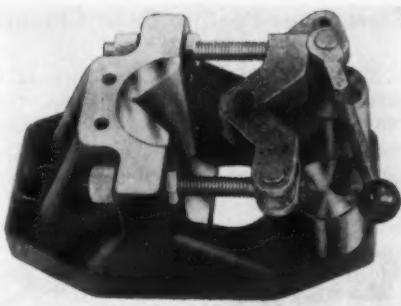
FREE CATALOG Upon Request

J. C. BUSCH COMPANY 126 E. Pittsburgh Ave.
Milwaukee 4, Wisconsin
Engineers and Machinists Since 1907

Unit Provides Basic Tool for Wide Variety of Holding Applications

Identified as the Model P-2, a multi-purpose work holder which is said to provide a basic tool for a wide variety of holding applications has been announced by Lassy Tool Co., Plainville, Conn. Standard interchangeable jaws and clamps for holding single or multiple pieces are said to be capable of holding odd shapes, as well as regular shapes. The basic tool is a heavy ribbed casting, properly normalized and precision ground, having a base with slots for bolting to the machine table. The base has a through hole to accommodate long work and is provided with a positive work stop bar recessed into the base. Standard accessories include counterbalance weights, drill bushing plate, riser blocks, work stops for single or multiple pieces and extension work stop sleeves.

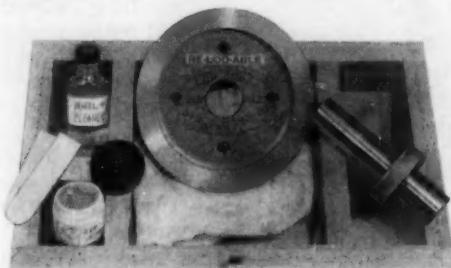
According to the manufacturer, the



Lassy Model P-2 Work Holder

compensating clamps for multiple holding are positive, have no springs and are sealed against dirt and grime. They are said to allow each piece to be held with equal pressure even though the pieces vary as much as 1/32 in. in size. All parts subject to wear are hardened, and the tool is said to be accurate to tenths.

Diamond Wheel Users: Save Money



Kit, shown above, consists of Diamond impregnated wheel, smear stick, "Roll-A-Set" ball bearing applicator, jar of "Lap-Loader" (12 carat diamond content) paste, and a bottle of Booth Diamond wheel cleaner fluid. Complete Price \$150.00. Satisfaction Guaranteed.

With New Booth "Re-Lod-Able" Diamond Face Wheels

The New Booth "Re-Lod-Able" Diamond Face Wheel provides a money saving, efficient and dependable means of quickly sharpening carbide tip tools. Six inch Diamond Face Wheel (fits 1 1/4" shaft) comes diamond impregnated (200 screen) with special "Roll-A-Set" Ball Bearing applicator, bottle of Carbide remover and jar of "Lap-Loader" diamond paste for quickly scouring and recharging this "Re-Lod-Able" diamond wheel. With this new process, a touch of "Lap-Loader" diamond paste on wheel face, driven in with the "Roll-A-Set" applicator, scours surface and wheel receives new sharp diamond edges to completely restore cutting action. Saves half time, stays sharp longer, gives better tool edges.

Write for complete details or demonstration at your plant.

Diamond Tool Co., 248 Broadway, South Haven, Mich.

Sole Manufacturers of "Re-Set-able" Diamond Tools.

Steel Rules Feature Satin Chrome Finish

The L. S. Starrett Co., Dept. MD, Athol, Mass., has announced that the No. C309R and No. C604RE Steel Rules now feature a satin chrome finish. The no-glare, hard wearing, multi-plate satin chrome finish is said to eliminate glare; make it easy to read the rule at any angle, in any light; speed up readings; and eliminate eye-



Starrett Satin Chrome Finish Steel Rules

strain. The finish is also claimed to resist moisture, acids, perspiration, rust and stains.

The No. C309R is a 6-in. flexible rule which has 16ths graduations on one edge and quick-reading 32nds and 64ths graduations on the other edge. The 64ths are numbered every 4th division. The No. C604RE, available in 6 and 12-in. lengths, is a spring tempered rule with 8ths and 16ths graduations on two edges and quick-reading 32nds and 64ths graduations on the other two edges. In addition, both ends of one side have 32nds graduations for measuring in close quarters.

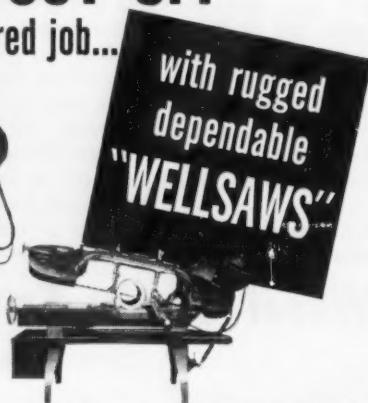
The rules also feature sharp, distinctive machine divided graduations which, according to the manufacturer, are uniformly clean cut, precisely spaced and easy to read.

METAL "CUT-OFF" becomes a preferred job...



featuring...

- Easily Controlled Operation
- Fast, Accurate Action
- High Job Productivity
- Low Operating Cost
- Long, Dependable Service



• Production, or utility "cut-off" work in your shop becomes a *Preferred Job* with a Wells Horizontal Metal Cutting Band Saw, because the *operation* is so *easy to control*. Even in the hands of the "new guy," a Wells Band Saw can be counted on to *Reduce your Production Costs*, through greater efficiency, more accurate cutting and real dependable service.

Call your Wells Distributor, or write for *Job-Engineering Service*.



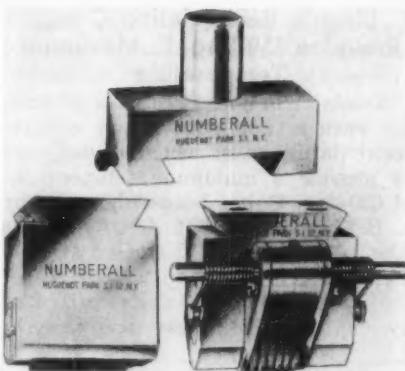
The Pioneers of Horizontal METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
808 TYLER ST. - THREE RIVERS, MICH.

Dovetail Adapter Allows Quick Interchanging of Numbering Machines with Type Holders

Numberall Stamp & Tool Co., Huguenot Park, Staten Island 12, N. Y., has developed a dovetail adapter which allows quick interchanging of numbering machines, automatic or non-automatic, with type holders or any other marking device. According to the manufacturer, the dovetail arrangement on the adapter allows horizontal rather than vertical insertion, providing easy sliding in and out of any marking device.

Removal of the marker is said to be accomplished without disturbing table adjustments. Since numbering machines and type holders are made the same height, practically no adjustment to regulate the depth of impression is necessary when interchanging. The adapter can be used on all Num-



(Top) Numberall Model No. 116 Dovetail Adapter. (Lower left) Numberall Model 23 D Type Holder. (Lower right) Numberall Model 50 Automatic Numbering Head

berall heads and Numberall Bench Press Models 93, 131, 136 and 137. The adapter can also be made to fit other presses.

People work better when they SEE BETTER MAGNI-FOCUSER SPEEDS PRODUCTION

At Allen B.
Du Mont
Laboratories
Inc. —

Using Magni-
Focuser to
inspect the
glass neck
assembly of
a television
picture tube



MAGNI-FOCUSER's
matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

With Third Dimensional (3-D) Vision Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents. Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Now aiding thousands of workers, the Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

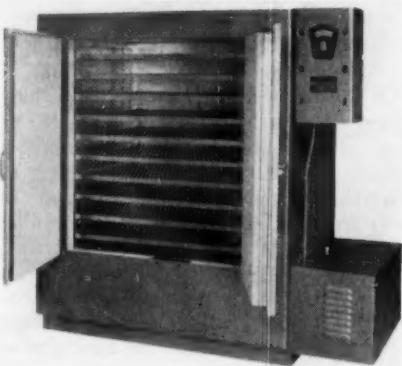
Send for descriptive folder

EDROY PRODUCTS CO.

480 Lexington Ave.
Dept. P, New York 17, N. Y.

Electric Recirculating Oven Provides 650-Deg. F. Maximum Temperature

Available in a large number of sizes for various applications, an electric recirculating oven which is designed to provide a maximum temperature of 650-deg. F. has been announced by K. H. Huppert Co., 6841 Cottage Grove Ave., Chicago 37, Ill. Open type elements are located in the bottom of the oven, and the air is recirculated by one or two stainless steel blowers,



Huppert Electric Recirculating Oven

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to 1/4" U.S.S. Inexpensive — Last for years.



Write for Circular
**NIELSEN TOOL &
DIE COMPANY**
P. O. Box 1067
Berkley, Mich.

depending upon the size of the oven. The motor to drive the blowers is installed in an easily accessible ventilated cabinet. The oven can be furnished with any type of temperature control desired.

TAP MAGIC

A Compound for
Tapping • Threading • Drilling • Reaming

NOT A CUTTING OIL!

SPEEDS Tapping and Threading
CUTS Clean Threads STOPS Tap Breakage
FREEZES Stuck Taps Instantly

EFFECTIVE ON ALL METALS

Alloys . . . Castings . . . Aluminum . . . Brass
Magnesium . . . Bronze . . . Titanium . . . Stellite
Steel (Mild, Normalized
Stainless, Tempered)

A standard 4 oz. can
Postpaid \$1.00 and the
name of your local supplier

SMITH TOOL & ENGINEERING COMPANY
A Division of Smith Case
Yucca City, Calif.

Low Temperature Chilling Machine Has 27 Cubic Feet of Usable Space

Cincinnati Sub-Zero Products, 3930-34 Reading Rd., Cincinnati 29, Ohio, has announced a large capacity, low temperature chilling machine which utilizes a chilling chamber measuring 36 x 42 x 36 in. deep, providing 27 cu. ft. of usable space. Exclusive of an outside mounted agitator motor, the

HIGH SPEED DRILLS

FLAT TWISTED AND ROLLED SECTION

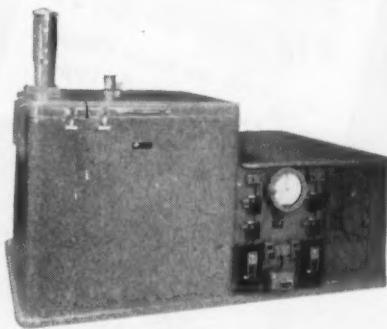
Special Lengths and Types. Prompt Delivery.
Manufacturers Since 1903

HI-DUTY DRILL WORKS
FLEETWOOD, PA.

overall dimensions of the unit are 96 in. long x 60 in. wide x 48 in. high. Adjustable temperature control is provided from minus 70 to minus 150 deg. F. Thermal capacity of the machine is 8,000 BTU's per hour at 120 deg. below zero, which is said to be sufficient to chill 200 lb. of steel per hour from plus 80 to minus 120 deg. Fahrenheit.

For use with a convection fluid, a 1/3-h.p. agitator is mounted in the left rear corner of the chilling chamber. A specially designed draft tube and fillet on the agitator are said to provide for controlled flow of convection fluid and uniform rapid cooling. For draining of convection fluid, a 3/4-in. drain has been placed in the bottom of the chilling chamber, leading out to a valve in the rear of the machine. When the unit is used without convection fluid, an air circulator mounted in the lid, with inlet and outlet ducts entering directly into the

chilling chamber, speeds chilling and prevents stratification of air. Instrumentation consists of a recording con-



Sub-Zero Large Capacity, Low Temperature Chilling Machine

trolling thermometer graduated from minus 150 to plus 50 deg. F. The machine features all steel construction.

**2 NEW
MAGNETIC
BASE
LIGHTING UNITS
SEND NOW
FOR FULL
DETAILS**

**TINCO
TITAN**
TRADE MARK

NO. 200

**MAGNETIC BASE "HANDI-LITE".
Pull 65 lbs.**

- ✓ Mounts to flat or down to 3/4" round surfaces, INSTANTLY!
- ✓ Sure-grip, non-breakable plastic case, 1 1/4" x 1 7/16" x 1 1/2" high.
- ✓ Rayon-flocked shield. 6 ft. cord. AC-DC.

PRICE \$8.50

**TINCO
TITAN**
TRADE MARK

NO. 250

**HEAVY DUTY VERSATILE DUPLEX MAGNETIC
BASE LIGHTING UNIT. Pull 125 lbs.**

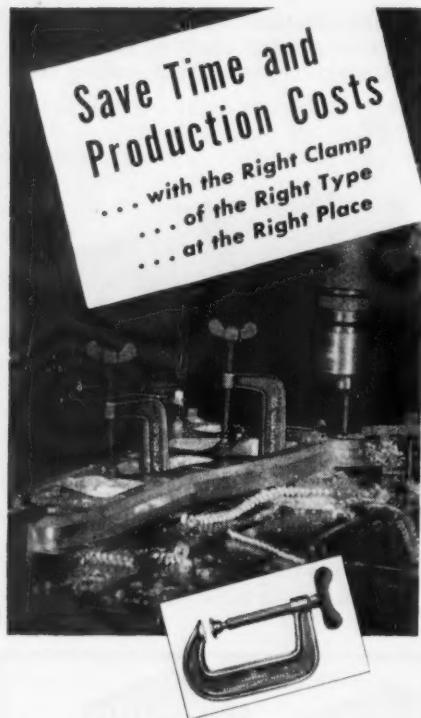
- ✓ Holds up to 100 watt bulb.
- ✓ Non-breakable Tenite plastic case, 1 1/4" x 4" x 1 1/8".
- ✓ Ball & socket flexible stem.
- ✓ Jack-type release.

PRICE \$18.50

Send for Bulletin No 605, covering other Tiny-Titan tools.

**ENCO MANUFACTURING COMPANY, Dept. 1114
4520-26 W. Fullerton Ave., CHICAGO 39, ILL.**

**Sold all over the U.S. and Canada
through Enco franchise dealers.**



HARGRAVE

"Load Tested" CLAMPS

are tested to prevent structural failure in use. Made in 36 types and 167 sizes for every industrial application.

Clamps are inexpensive tools that can save money in production and maintenance costs. Your Local Industrial Distributor is trained to aid you in proper selection and application.

Ask your Distributor for a copy of the new complete Hargrave catalog with application information.

THE CINCINNATI TOOL CO.
1947 Waverly Avenue, Cincinnati 12, Ohio

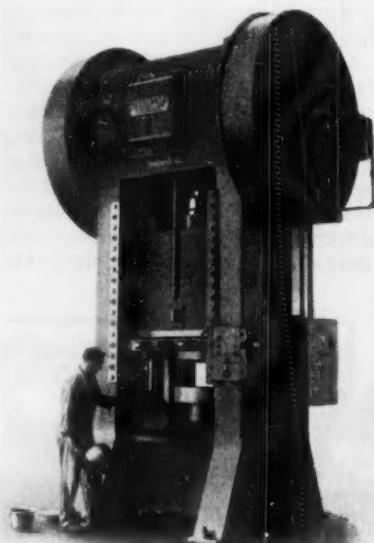


HARGRAVE
The Complete Line of Tested
TOOLS

Press Is Designed for High-Production Deep-Drawing Operations

Designated as the Steelweld "Hi-Draw," a press for high-production deep-draw work has been introduced by the Steelweld Machinery Division of The Cleveland Crane & Engineering Co., 6436 E. 282nd St., Wickliffe, Ohio.

The machine is designed to operate at high speeds during the non-

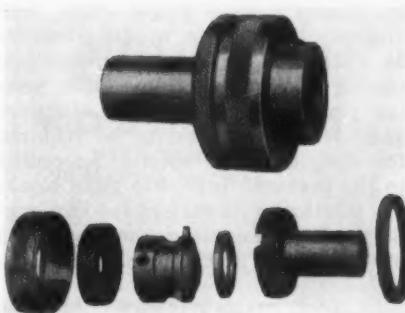


Steelweld "Hi-Draw" High Production Deep-Draw Press

productive portion of the ram stroke and at a slower, correct drawing speed during the working part of the stroke. This is said to be accomplished through a newly developed linkage that provides quick approach, quick return and slow constant velocity through the drawing range. The press is available in single or double-action—one, two, or four-point types—and in sizes ranging from 160 tons capacity and up.

Reamer Holder Features Synthetic Rubber Float Sleeve

The Green Mfg. Co., Rockton, Ill., has announced a full floating reamer holder which features a pliable, synthetic rubber float sleeve that is said to compensate for both angular and out-of-parallel misalignment of the machine spindle and turret. According to the manufacturer, chatter is eliminated by the rubber float sleeve mounting which acts as a cushioning device. This rubber mounting, it is claimed, also guards against tool-breaking shocks, thus lengthening the reamer service life and reducing tool costs. The design of the holder makes possible the use of either long shank chucking reamers or short shank screw machine reamers, without shortening the shank or reamer part. Positive drive of the reamer is said to be accomplished through a reamer head by a unique, floating U-shaped drive key. To compensate for the over-



Green Full Floating Reamer Holder

hung weight of the reamer, the tension of the float sleeve can be changed by turning the adjusting nut.

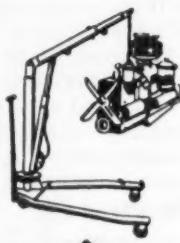
Large Sine Plate Features Mechanical Raising and Lowering

Omer E. Robbins Co., Dept. B-1, 5722 Twelfth St., Detroit 8, Mich., has

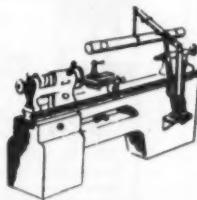
SOLVE YOUR LIFTING PROBLEMS EASILY... with a UNIT "Utility" HOIST!

Manual or electrical operation

A hoist of many uses, and easily changed from one to another as needed. The Unit "Utility" Hoist can be used on a truck bed, a floor frame or mounted on a machine.



FLOOR TRUCK for moving materials, dies, fixtures, etc.



MACHINE MOUNTING saves time and labor.



TRUCK MOUNTED for easy handling of heavy loads.

Hydraulic power lifts loads up to 2000 lbs. See how a Unit "Utility" Hoist will solve your lifting problems. Ask your industrial distributor or write direct TODAY for details and LOW PRICES.

— UNIT MANUFACTURING COMPANY —

1223 HARMON PLACE • MINNEAPOLIS 3, MINNESOTA

introduced a large single angle, non-magnetic sine plate which measures 24 x 24 in. and features mechanical raising and lowering for quick, easy top plate adjustment. Only standard gage blocks are said to be required for fast, accurate setups. According to the manufacturer, the gage blocks are positioned on each of the two gaging pads, eliminating the possibility of distortion and dimensional inaccuracy.

CUT TOOL COSTS

broken tools
made like new again
with **NU-TANGS**

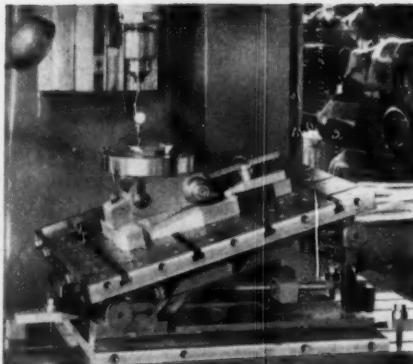
Twisted or broken tangs replaced at low
costs on any tool with a Morse Taper (sizes 1 to 6)
Hundreds of leading industries save money on drills,
reamers, countersinks, cutters, drivers, the NU-TANG way.
Prompt delivery. Send for prices—or send tools for repair.
All work guaranteed.

NO WELDING! NO SLEEVES!
NO SHORTENING! NO DISTORTION!
Send them to us like this!

GUARANTEED STRONG AS NEW! We return them like this!

* Patent No. 2,512,000

NU-TANGS INC. 1339 Bates Avenue
Cincinnati 25, Ohio



Robbins Large Single Angle, Non-Magnetic Sine Plate in use

curacies. When two sine plates are used together, they are said to make an ideal setup for any compound angle. The top plate and base plate are cast and scraped parallel to 0.0005 inch. The distance between roll centers is 20 inches, and maximum angle setting is 60 degrees.

Drawn Tote Pan Is Lightweight and Leakproof

Identified as the "Pak-N-Stak," a drawn tote pan which is lightweight and leakproof has been announced by Bathey Mfg. Co., 100 S. Mill St., Plymouth, Mich. Designed to fit the needs of production shops of all types, the pan features full rolled edge construction, combining maximum strength factor and safety feature

RAYMAC Solid Carbide DRILLS and REAMERS

Raymac drills cut hardened metal . . . do not burn or anneal. Feature operational speeds of 350 to 600 RPMs depending on size and hardness of metal.

Raymac solid carbide reamers are custom designed for individual jobs.

Write for catalog No. 12

RAYMAC
MANUFACTURING COMPANY INC.
3729 CASS AVENUE, DETROIT 1, MICH.

LW

SWIVEL BASE MILLING MACHINE VISES

As low as
\$24.00

Send for free catalog on vises, power back saws, magnetic chucks, dividing heads.

L-W CHUCK COMPANY
28 SO. ST. CLAIR STREET
TOLEDO 4, OHIO

when handling. Minimum side taper allows full nesting, and the pan has a full cubic content capacity of 825 cu. inches. The design of the pan permits stacking one on the other in groove lock fashion, even when filled flush with the rolled edge top. Contents remain visible at two points for positive identification. When empty, the pan nests, requiring minimum storage space when out of service. Provision is made for gripping from any side,



Bathey "Pak-N-Stak" Tote Pans

with ample space between nested pans.

The tote pan is available in cold rolled steel, with cadmium plating, or in aluminum and measures 18 $\frac{1}{4}$ x 10 $\frac{1}{8}$ x 5 $\frac{1}{2}$ in. overall. The pan weighs 5 pounds.

Unit Separates Gears into Acceptable, Salvageable and Non-Salvageable Categories

Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich., has announced a conveyor-type gear classifier, designated as the "3-Way," which

NUMBERALL

MODEL 70

MULTI-WHEEL NUMBERING MACHINE

The most efficient method of stamping numbers into metal. Repeats the same numbers until changed. Model 70 NUMBERALL Machines are used in all industries to mark various parts. Stamps numbers, etc., quickly... neatly. Perfectly aligned. Much better marks are produced by these machines than by single stamps or steel type, and at a far lower cost. Shank for Hand or Press and with any number of wheels from 3 to 20. Can be furnished in 1/32" to $\frac{1}{8}$ " high figures, sharp face gothic or shaded roman style.



Hand shank illustrated. Press shank for foot or power presses also available.

Write for Bulletin MM-70.

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

CLIPPER

PRECISION DIAMOND TOOLS

Industrial Diamonds
Thread Grinders
Turning Tools
Engraving Tools
Dressing Tools
Diamond Powder

Manufacturers of
**DIAMOND
WHEELS**

and Hones of
highest quality.
Prompt delivery.
Ask for literature.

Representatives in Principal Cities



CLIPPER DIAMOND TOOL CO., INC.
21-C W. 46 ST. N.Y. 36



separates gears into acceptable, salvageable and non-salvageable categories. These classifications may be based on any one or a combination of the following gear sizing factors: undersize, oversize, correct size, eccentricity and plus or minus helix angle. The conveyor model has been developed to handle wide-face and cluster gears. Gears enter from the left side of the classifier on a continuous belt convey-



Michigan "3-Way" Conveyor-Type Gear Classifier

RUST-LICK

STOP IN
AQUEOUS SYSTEMS

RUST-LICK "B"

For use wherever water comes in contact with Ferrous Metal.
STOPS RUST IN

Hydrostatic-Pressure Testing
Cleaning and Washing
Heat-Treating
Grinding Operations
Additive to Soluble Oils

ELIMINATES:

Fire Hazards • Toxicity
Dermatitis • Degreasing

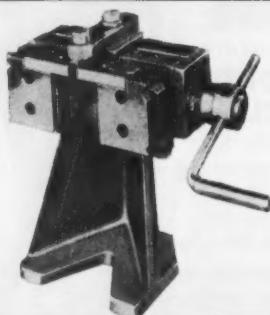
Write for free sample and brochure.

PRODUCTION SPECIALTIES, INC.

755 BOYLSTON STREET
BOSTON 16, MASS

or, with the gear face perpendicular to the line of conveyance. The production gears are rotated between two master gears; namely, the driving gear and the driven gear. The driving gear is rigidly mounted and consists of two face sections $\frac{1}{16}$ in. in width, and the driven gear is pivotally mounted and has a single face section of the same width. According to the manufacturer, one of the advantages of the sectional master gear design is the ease with which it meshes with the incoming gears on the conveyor belt.

If the production gears meet the size specifications, they continue along on the conveyor until they are unloaded at the end. Should any one of the discrepancies arise for which the classifier is designed to check, the



The "JOHN'S" DRILL JIG

For cross or end drilling round, hexagon, or square stock or standard or odd-shaped castings from $\frac{1}{8}$ " to 8" O.D. the self-centering "JOHN'S" Drill Jig cuts tooling and production costs to minimum for 10 to 100,000 pieces. Standard removable slip fit bushings and holders available to drill center or mean off-center. Bushing holders for multi-drill operations easily toolled. The self-centering action will hold within .0015" or better regardless of jig wear or piece part O.D. variation. Ideal for holding rough castings. Jig available in three sizes 6", 8", 14"; Jaw openings $2\frac{1}{2}$ ", $3\frac{1}{4}$ ", $7\frac{1}{2}$ ".

For information on hundreds of uses for jig or tooling recommendations for specific job, write:

HEUSER MANUFACTURING CO.

1640 N. PAULINA ST., CHICAGO 22, ILLINOIS

master gears provide the signal source that actuates the corresponding rejection gate, and the gear is swept into the salvageable or non-salvageable chute. The gear classifier, it is claimed, will check all gears coming from the highest speed gear production line, and will also turn off a gear producing machine should consistent gear size errors be detected.

Die Head Is Applicable to B&S Automatic Screw Machines

Landis Machine Co., Waynesboro, Pa., has announced the $\frac{1}{2}$ -Inch EXX "Landmatic" Die Head for application to Nos. 0, 0G, 2 and 2G Brown and Sharpe automatic screw machines. Compactly designed, the die head features long life tangential chasers and has a range coverage from No. 4 to $\frac{1}{2}$ in. inclusive. Unlimited thread

length is said to be available for workpieces under $\frac{3}{8}$ in. in diameter, while a maximum of $1\frac{1}{8}$ in. thread length can be obtained on larger workpieces.

The head is designed with a floating shank with adjustable spring tension to provide a means by which the lead of the feed cam may be compensated for in varying degrees.

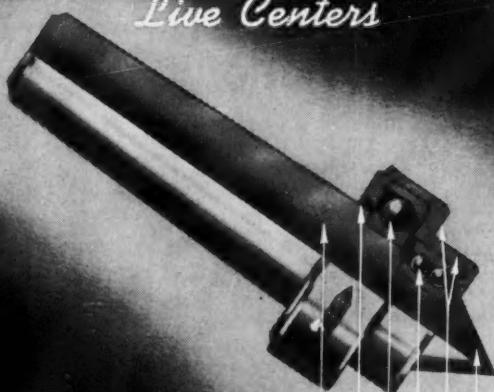
Landis $\frac{1}{2}$ -Inch EXX "Landmatic" Die Head

Thus, the die head is always able to start the threading operation with the amount of pressure suitable for the thread pitch being produced.

The head is an external trip type and is made of alloy steel. All operating parts have been heat treated after machining.



ENGINEERED *Live Centers*



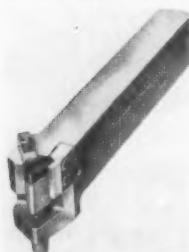
Standard shanks with Morse tapers carried in stock . . . send us your specifications and blueprints . . . we will see that your job is set up with the right LIVE CENTER

STURDIMATIC
TOOL COMPANY

1904 F STREET • DETROIT 16, MICH.

Toolholder Accommodates Triangular, Square and Round Carbide Inserts

Identified as the "Econo-Clamp," a mechanical toolholder which is de-



Newcomer "Econo-Clamp" Mechanical Toolholder

ened steel anvil, of all the carbide of any length insert, ranging from the standard 1½-in. length, down to the ¼ in. long "Throwaway" insert. The rugged structure and

design of the holder is said to make it ideal to use for both heavy roughing and precision finishing operations. Throwaway carbide inserts, available in all Newcomer grades of carbide, permit the use of the many cutting edges available simply by indexing.

Improved Vertical Milling Machine Has Relocated Vertical Feed Handle

The U. S. Burke Machine Tool Division, 3 Brotherton Rd., Cincinnati 27, Ohio, has announced several improvements in its vertical milling machine, including the relocation of the vertical feed handle for greater convenience and the addition of a micrometer dial which gives accurate indication of table setting or movement on both ends of the table. The improved machine has a hard chrome-plated quill which is carried in the precision bored and honed head for unusual ac-

ALL BRONZE PUMP - AT A "CAST-IRON" PRICE

Sutton COOLANT PUMPS

MOTORS BY



- Rugged all bronze pump housing, impeller and shafts. NO FLIMSY STAMPINGS USED.
- Inexpensive—cost no more than ordinary cast-iron and steel pumps.
- No metal to metal contact assures longer life—may be used to pump liquids containing grit or abrasives.
- Standard speed motor for extra long life and quietness.
- Complete with switch and cable, flexible hose, shut-off valve and flexible steel nozzle.
- Compact design — easy to clean or change liquids.



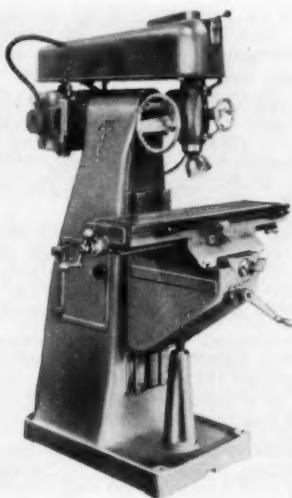
WRITE FOR LITERATURE
ON THIS AND OUR OTHER
INDUSTRIAL PRODUCTS

Sutton Manufacturing Corp.
112 W. WILSON AVENUE NORFOLK, VIRGINIA

For over 15 years the
marine industry's largest
producer of small
bronze pumps

Only
\$59.50

curacy. According to the manufacturer, a new draw bar speeds tool changes and protects the tools at the same time. Tightening or loosening a single nut sets or releases tools from the spindle taper without danger of dropping the tools. To the conventional telescoping chip guard which keeps chips from the knee screw, a permanently secured plate above the knee gears has been added to keep all chips out of the gearing.



Improved U.S. Vertical Milling Machine

Optional accessories available for the improved milling machine include hardened and ground lead screws which have a combined maximum runout over the entire length within 0.0005 in., and a longitudinal power table feed which is instantly reversible and infinitely variable (while in operation) between 0 and 12 in. per minute. When coolant is supplied, a coolant tank fits entirely within the machine pedestal. The machine has a 9 1/4 x 36-in. table which feeds 24 in. longitudinally, 9 3/4 in. in cross feed and 16 1/2 in. vertically.

BROACHES

... Designed

... Manufactured

... Sharpened

We are fully equipped for

PRODUCTION BROACHING

... Internal

... External

... Surface

Dependable Quality and Service

All inquiries handled promptly

RADCO CORPORATION

856 N. Spaulding Ave., Chicago 51, Ill.

Also designers and manufacturers of

Forming Tools

Circular — Flat — Dovetail

Win WITH
RIVERSIDE
 Custom-Made Castings

RIVERSIDE FOUNDRY

BETTENDORF, IOWA

IOWA'S LARGEST INDEPENDENT FOUNDRY

Steel and Gray Iron

DAVENPORT EXCHANGE 5-1811

new literature

1. Oil Groovers and Attachments for obtaining a variety of different types of oil grooves are described in a catalog published by Fischer Machine Co., 310-16 N. Eleventh St., Philadelphia, Pennsylvania.

2. Balls, Blow Guns, Chucks, Clamps, Handles and Knobs, Hand Wheels, Vises and Die Components, as well as various other toolroom accessories, are described in a catalog (No. 254) issued by Reid Tool Supply Co., Muskegon Heights, Michigan. Prices are included in the catalog.

3. Live Centers, adjustable to take up wear and preload bearings, are described in a bulletin (No. NL-1) released by Nielsen, Inc., Lawton, Michigan.

4. Precision Boring and Honing. American Hollow Boring Co., Erie 4, Pa., has issued a bulletin (No. HC-1) describing its facilities for boring and honing cylinders and shafts to specifications.

5. Materials Handling Equipment, including the "Shoplifter," "Worklifter," elevating tables and trucks, is described in a bulletin (No. 54) published by Economy Engineering Co., 4507 W. Lake St., Chicago 24, Illinois.

6. Flat Ground Die Steel. A pocket-size data booklet listing sizes and uses of flat ground die steel, together with prices, weights, analysis, and so on, is available from Simonds Saw and Steel Co., Dept. L, Fitchburg, Massachusetts.

7. Hydraulic Face and Knife Grinders. Lobdell United Co., Subsidiary of United Engineering and Foundry Co., Wilmington 99, Del., has issued a bulletin describing the Bridgeport line of grinding machinery.

8. Quenching Oil. Gulf Oil Corp., Gulf Refining Co., 1822 Gulf Bldg., Pittsburgh 30, Pa., has issued a booklet describing "Super-Quench," a dual-action quenching oil.

9. Magnetic Chucks, Parallels, V-Blocks and Top Plates are described in a bulletin (No. C-53) released by Hanchett Magna-Lock Corp., Dept. MM, Big Rapids, Mich. Specifications are included in the bulletin.

10. Material Handling and Storage Equipment, including tote pans, boxes, adapters, pallets and bins, are described in a catalog published by Bathey Mfg. Co., 100 S. Mill St., Plymouth, Michigan.

11. Industrial Chilling Equipment for shrinking, testing and treating of metals is described in a bulletin (No. 102) released by Cincinnati Sub-Zero Products, 3930-S3 Reading Rd., Cincinnati 29, Ohio.

12. Automatic Multi-Spindle Machines for drilling, tapping, milling, screw inserting and assembly of small parts are presented in case history form in a brochure published by Bodine Corp., Mountain Grove Ave., Bridgeport 5, Connecticut.

13. Electronic Machining and Grinding is fully described in a series of eight individual bulletins published by Elox Corporation of Michigan, 739 N. Rochester Rd., Clawson, Mich. Line drawings are included in the bulletins.

14. Combination Magnetic and Fabric Filter, identified as the Kleenall, which separates by means of a permanent magnetic field and cleans by filtration is described in a bulletin (No. 350-E) issued by Barnes Drill Co., 860 Chestnut St., Rockford, Illinois.

USE CARD FOR FREE LITERATURE

15. Coolant Filters. Industrial Filtration Co., Dept. L-294, 13 Industrial Ave., Lebanon, Ind., has issued a folder on Delpark Coolant Filters, designed for use on Landis Precision Grinders, which provide fast, efficient, automatic coolant filtration.

16. Special Taps, Round Dies and Reamers are listed in a catalog released by Joseph A. Battle & Co., Inc., 47 Hillside Ave., Manhasset, N. Y. Complete specifications are included.

17. Drill Jig. Heuser Mfg. Co., 1638 N. Paulina St., Chicago 22, Ill., has published a bulletin describing the John's Drill Jig, a versatile self-centering workholding device for precision economical production. Dimensional drawings are included.

18. Mechanical Horizontal Broaching Machines for high-speed surface broaching operations are described in a bulletin (No. HM-54) issued by Colonial Broach Co., P.O. Box 37, Harper Station, Detroit 13, Mich. Information on features and applications is provided.

19. Precision Cabinet Lathe, designated as the 918 "Steelway," is described in a bulletin (No. 918-SLB) published by Rivett Lathe & Grinder, Inc., Dept. MMR, Brighton 35, Boston, Mass. Data on features and accessory items are included.

20. Engine and Removable Block Gap Lathes, designated as the 20-in. "LA" Series, are described in a brochure prepared by The Nebel Machine Tool Co., 3409 Central Pkwy., Cincinnati 25, Ohio. Complete specifications are included.

21. Rigid Rib Type, Deep Throat Powder Presses, identified as the Models 4R and 5R with 4 and 5-ton capacities respectively, are described in a catalog issued by Kenco Mfg. Co., 5211 Telegraph Rd., Los Angeles 22, California.

22. Production Tools, including tapping heads, drill heads, drill chip breakers, drill units and drilling coolant tables, are described in a catalog (No. 954-1) published by Commander Mfg. Co., 4224 W. Kinzie St., Chicago 24, Illinois.

23. Nickel-Bond Diamond Wheels designed for use on high speed steel where wheel speed can be set at 6,000 s.f.p.m. or more are described in a bulletin published by Metalloid Equipment, Inc., Huntington, Indiana.

24. Air Actuated Adjustable Bar Folder is featured in a bulletin (No. 74-B) released by Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y. Operating data and specification tables are included, as well as illustrations of examples of sheet metal work produced.

25. Grinding Wheels are described in a catalog (No. 1052) issued by Norton Co., Worcester 6, Mass. Data on grinding wheel selection and a supplement of net prices in quantity lots are included.

26. Air Operated, Press-Type, Three Phase Projection Welders and Spot Welders, designated as the EPT1 and SPT1 respectively, are described in a bulletin (No. 325-1) published by Sciaky Bros., Inc., 4915 W. 67th St., Chicago 38, Illinois.

MODERN MACHINE SHOP

November, 1954

(THIS CARD MUST BE USED BEFORE JANUARY 1, 1955)

Please send the following literature which I have encircled below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54	55	56	57	58	59	60

NAME _____ POSITION _____

COMPANY _____

STREET _____

CITY _____ ZONE _____ STATE _____

TEAR OFF AND
MAIL THIS CARD TODAY
FOR FREE LITERATURE

27. Multiple Wheel Grinders, designated as the 10 and 14-in. Type H-IW, for grinding multiple diameters simultaneously are described in a catalog (No. P-54) published by Landis Tool Co., Waynesboro, Pa. Line drawings and specifications are included.

28. Hydraulic Surface Grinder. Boyar-Schultz Corp., 2020 S. 25th Ave., Dept. C-M, Broadview (Chicago), Ill., has issued a catalog describing its 6 x 12 Hydraulic Surface Grinder.

29. Shaft Mounted Speed Reducers offering advantages possible only with double-enveloping worm gearing are detailed in a bulletin (No. CD-323) available from Cone-Drive Gears Division, Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Michigan.

30. Anchor Bushings for sheet metal and laminate plastic drill templates are described in a fourth edition catalog prepared by The Hi-Shear Rivet Tool Co., 8924 Bellanca Ave., Los Angeles 45, California.

31. Abrasives, including grinding and polishing wheels, cut-off wheels, mounted points and wheels and sticks and blocks, are described in a catalog (No. 100) published by Sandusky Abrasive Wheel Company of Illinois, Inc., Sycamore, Illinois.

32. Oversonic Granite Surface Plates which keep close tolerances without realignment or resurfacing are described in a bulletin issued by The Herman Stone Co., 324 Harries Bldg., Dayton 2, Ohio.

33. Electronic Airfoil Milling Machine, designated as the Model 102, which is designed to accurately produce first original three-dimensional master forms is described in a circular (No. 575) released by Pratt & Whitney, Division Niles-Bement-Pond Co., 25 Charter Oak Blvd., West Hartford 1, Conn. Specifications and line drawings are included.

34. Belt Power Transmission, identified as "Poly-V" Drive, is described in a brochure (No. 6638) published by Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, New Jersey.

35. Universal Bending Machine, designated as the "Multiform" Big Brother, which operates on 100-lb. air pressure is described in a catalog issued by J. A. Richards Co., Dept. 6-M, 903 N. Pitcher St., Kalamazoo, Michigan.

36. Facilities Folder and Equipment List covering their extensive precision contract manufacturing facilities have been published by Johns-Hartford Tool Co., Inc., 390 Capitol Ave., Hartford, Connecticut.

37. Hole Locator. Glover Mfg. Co., 736 Mohican Place, Meadville, Pa., has released a catalog describing the "Wiggle" which is said to provide 0.0005 in. hole location in three minutes.

38. Cross-Slide Rotary Table which is said to permit accurate boring and grinding of multiple radii and angular cuts with a standard vertical mill at high speeds is described in a folder issued by Advance Products, Benton Harbor, Michigan.



BUSINESS REPLY CARD

First Class Permit No. 487, Sec. 34.9, P. L. & R., Cincinnati, Ohio

MODERN MACHINE SHOP

**431 MAIN STREET
CINCINNATI 2,
OHIO**



**MAIL THIS CARD TODAY
for free literature
...no postage to pay!**

39. "How Flat Should Surface Plates Be?" is the title of a folder released by Rahn Granite Surface Plate Co., 641 N. Western Ave., Dayton 7, Ohio.

40. **Tube and Pipe Notching Unit**, designated as the "Super Fast" Twin-Notch "Arc-Fit," which is said to notch clean is described in a bulletin published by Vogel Tool and Die Corp., 1823 N. 32nd Ave., Melrose Park, Illinois.

41. **Decimal Equivalent Chart** which is printed in three colors has been offered by John Hassall, Inc., Box 2177, Westbury, Long Island, N. Y. The chart is plastic coated and desk size.

42. **Floating Toolholders**, identified as "Toolflex," are described in a bulletin issued by Burg Tool Mfg. Co., P.O. Box 48, Gardena Station, Gardena, California.

43. **Universal Scroll Chucks** with 0.0005 in. precision are covered in a catalog (No. 53) published by Buck Tool Co., 1014 Schippers Lane, Kalamazoo, Mich.

44. **Circular Metal Cutting Saws** are described and illustrated in a catalog (No. N) released by Circular Tool Co., Providence 5, R. I. A cutting speed conversion table is included.

45. **Air Powered Vises**, designated as "Vi-Speed," are described in a brochure released by Van Products Co., 3770 W. 12th St., Erie 2, Pa. Various time-saving applications of the vises in holding and pressing jobs are discussed.

46. **Press Room Equipment**, including roll feeds, stock oilers, reels and straighteners, scrap choppers, wire straighteners, foot presses and coil cradles, is described in a catalog published by Durant Tool Supply Co., 136 S. Water St., Providence 3, Rhode Island.

47. **Open Back Inclinable Presses** for fast, safe, economical press work are described in a catalog issued by The Federal Press Co., 504 Division St., Elkhart, Indiana.

48. **Collets and Feed Fingers** are described in a booklet, written and illustrated in a semi-jocular manner, published by The Balas Collet Mfg. Co., Cleveland 14, Ohio.

49. **Precision Internal Chuck**. Practical applications and general information on the Speedgrip Precision Internal Chuck are presented in a manual (No. 11) published by Speedgrip Chuck, 820 N. Ward St., Elkhart, Indiana.

50. **Standard Cabinet-Type Sandblast Machines** featuring over-size viewing glasses are described in a bulletin (No. 6224) issued by Leiman Brothers, Inc., 149 Christie St., Newark 5, New Jersey.

51. **Centrifugal, Circulating and Coolant Pumps**, designated as the Class KRV and KRVS Motorpumps, are described in a catalog (Form 7074-D) released by Ingersoll-Rand Co., 11 Broadway, New York 4, New York.

52. **Air Compressor**, designated as the 105 Utility "Airmaster," which is specially designed for public utility service is described in a bulletin released by Le Roi Co., 1706 S. 68th St., Milwaukee 14, Wisconsin.

53. **Master Pusher Kits** for Brown & Sharpe machines are covered in a catalog published by The Benco Collet Mfg. Co., Cleveland 14, Ohio.

54. "Shaft Inspection by Optical Gaging" is the title of a brochure issued by Optical Gaging Products, Inc., 26 Forbes St., Rochester 11, N. Y. The principle described is the "dual-image" idea of two simultaneous images on a contour projection screen.

55. **Free-Machining Tool Steels** are described in a folder released by Vanadium-Alloys Steel Co., Latrobe, Pa. Specifications are included.

56. **Dust Collectors**. The reasons for selecting individual unit-type collectors over a centralized system for a row of seven Cincinnati Universal Grinders are given in a bulletin (640 No. 4) available from Aget-Detroit Co., 207 Main St., Ann Arbor, Michigan.

57. **Dial Born Gages and Dial Snap Gages** are described in a bulletin (No. 354) released by Boice Mfg. Co., Inc., Albany Post Rd., Staatsburg, N. Y.

58. **Standard Jig and Fixture Components** are covered in a catalog issued by Lodding, Inc., Dept. NT2, 79 Beacon St., Worcester 1, Massachusetts.

59. **Drilling Machines**. Bryant Machinery & Engineering Co., 640 W. Washington Blvd., Chicago 6, Ill., has issued a catalog (No. 600) describing Cleereman Drilling Machines.

60. **Stainless Steel**. Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa., has issued two catalog sections describing C.Y.W. Choice and Type 420 Stainless Steel.

USE CARD FOR FREE LITERATURE

metalworking news in brief

At a recent meeting of the board of directors of The Taft-Peirce Mfg. Co., Woonsocket, R. I., **F. Steele Blackall, III**, was elected a vice president of the company. Mr. Blackall is also assistant treasurer and a director of the company.

— o —

Farrel-Birmingham Co., Inc., Ansonia, Conn., has announced the promotion of **Philip H. Dreissigacker** to the position of assistant chief engineer. Mr. Dreissigacker has been associated with the company since 1937.

— o —

Le Roi Co., Milwaukee, Wis., has announced the appointment of **Jack E. Heuser** as vice president in charge of sales. Mr. Heuser will be responsible for the organization and management of a newly created sales division which will sell and service Le Roi products.

— o —

Henry Disston & Sons, Inc., Philadelphia, Pa., has announced the appointment of the following sales engineering specialists: **F. W. Hallowell** will serve compressor manufacturers requiring valve plates, plastic manufacturers, doctor and fountain blade users and industry users requiring circular knives; **R. Cresser** will handle carbide-tipped saws for non-ferrous cutting, tube sawing and other allied uses; and **A. Campbell** will focus his attention on hack saw blades and metalcutting band saws.

Boyar-Schultz Corporation has moved to its new plant located at 2000 S. 25th Ave., Broadview (Chicago), Illinois.

— o —

The appointment of **A. R. Ryan**, 5439 Eads St., New Orleans, La., has field sales representative has been announced by Buckeye Tools Corp., Dayton, Ohio. The Ryan organization will service Buckeye air and electric power tool customers in Louisiana, Mississippi, western Florida and lower Alabama.

— o —

The Lincoln Electric Co., Cleveland, Ohio, has announced the appointment of **Robert J. Hirsch** as district sales manager to head its North Haven office. Mr. Hirsch will be responsible for the sales of Lincoln arc welding machines and electrodes throughout Connecticut. The company has also announced the appointment of **Richard P. Lindgren** as district manager in Moline, Illinois. Mr. Lindgren will be in charge of sales of Lincoln arc welding machines and electrodes in the northwestern Illinois and central and eastern Iowa areas.

— o —

The Ohio Crankshaft Co., Cleveland, Ohio, has announced the appointment of **L. C. Schweitzer** as assistant general manager of the company's TOCCO Division. Mr. Schweitzer was formerly Chicago district manager for TOCCO.

Metalworking News in Brief

L. R. Farrell has joined the High Frequency Division of Lindberg Engineering Co., Chicago, Ill. Mr. Farrell will specialize in motor generator induction heating sales.

— O —

Ready Tool Co., Bridgeport, Conn., has announced the following distributor appointments: **Bauer Factory Supply**, Irvington, N. J.; **Bearings, Inc.**, Cleveland, Ohio; **H. W. Mills & Co.**, Passaic, N. J.; **Chas. A. Strelinger Co.**, Detroit, Mich.; **Waltz-Dettmer Supply Co.**, Cincinnati, Ohio; **H. D. Taylor Co.**, Buffalo, N. Y.; **Tocaro Machinery Co.**, Philadelphia, Pa.; and **Flack Equipment Co.**, Dayton, Ohio. The company has also announced the appointment of **Donald B. Hunting**, 7446 Vine St., Cincinnati, Ohio, as its representative for southern Ohio.

— O —

Virgil Fortner has been appointed exclusive representative in the Chicago area for Gorham Tool Co., Detroit, Mich. In his new capacity, Mr. Fortner will handle the complete line of Gorham standard cutting tools.

The appointment of **Harold Wrigley** as works manager and **Charles S. Basney** as new products manager has been announced by The Barry Corp., Watertown, Massachusetts.

— O —

Barnaby Mfg. Co., Bridgeport, Conn., has announced the appointment of **Louis S. Kutscher** as sales manager for the metalworking tool, record dies and accessories, railway gages, hardware and special equipment divisions.

CUT COSTS 66%

INCREASE PRODUCTION 300%

PRECISION automatic FLEXOPRESS

Running at 240 S.P.M. a Precision Automatic Flexopress produced 18-gauge perforated tin plate for ice cube trays as against previous production at 75 strokes S.P.M. with a Punch Press. Savings of this kind will quickly pay for a Flexopress in your plant.

30-TON HIGH SPEED

PRECISION WELDER & FLEXOPRESS CORP.

138 E. MCMICKEN AVE. CINCINNATI 10, OHIO

Metalworking News in Brief

The Ohio Crankshaft Co., Cleveland, Ohio, has announced the appointment of **A. O. Wood**, former district engineer, to the post of Chicago district manager for its TOCCO division. Mr. Wood will be responsible for sales, engineering and service of TOCCO induction heating equipment in the area served by the Chicago office. He has been associated with Ohio Crankshaft since 1929.

Lukens Steel Co., Coatesville, Pa., has announced three promotions in its sales division. **W. Harrison Lackey**, former manager of plate sales, has been appointed manager of field sales. **Charles A. Carlson, Jr.**, has advanced to manager of carbon plate sales. Mr. Carlson was formerly assistant manager of the New York district sales office. **Robert L. Cahoon**, former assistant manager of clad and foreign conversion, has been named manager of alloy plate sales.

— O —

Clearing Machine Corp., Chicago, Ill., has announced the opening of a direct factory office at 5 St. Paul St., Rochester 4, N. Y., to serve the upper and western parts of the state. **Robert J. Falsey** will be in charge of the new office.

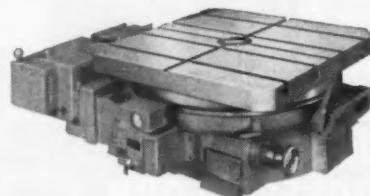
— O —

Lipe Rollway Corp., Syracuse, N. Y., has announced the appointment of **Thomas H. Kenny** as field service representative for its clutch division. Mr. Kenny will contact Lipe clutch distributors and jobbers concerning service problems.

— O —

George J. Zimmerman, formerly chief of the Technical Liaison Division, Office Chief of Engineers, Corps of Engineers of the U. S. Army, has been appointed staff assistant for management controls of The Carborundum Co., Niagara Falls, New York.

FASTER set-ups and positioning



You save set-up and positioning time with Gilbert rotary tables. *Hand-indexing*: 36" and 50" square or round. *Power rotary and power feed*: 36", 50", 60", and 72" square or round. Special tables built to your requirements. For complete descriptions and specifications, write for *Bulletin 854*.

THE CINCINNATI **GILBERT** MACHINE TOOL COMPANY • CINCINNATI 23, OHIO



J. S. Coleman, President
Burroughs Corporation

"Business Publications are essential tools of management"

"To keep abreast of rapidly developing techniques in all areas of business operations," says Mr. Coleman, "is not an easy task. Yet, if management is to discharge the responsibilities laid upon it, it must be informed both of technical developments and, indeed, of events and trends of the nation as a whole."

"Without business publications," Mr. Coleman adds, "the job would be impossible. As the size and complexity of the job have grown, management has come to depend increasingly on business publications for information necessary to sound judgment."

When editorial pages are read with eagerness, advertising pages in those same publications have equally high specialized value. They provide a direct sales route for any product or service of benefit to business or professional men.



NATIONAL BUSINESS PUBLICATIONS, INC.

1001 Fifteenth Street, N. W., Washington 5, D. C. • STerling 3-7535

The national association of publishers of 165 technical, professional, scientific, industrial, merchandising and marketing magazines, having a combined circulation of 3,849,056... audited by either the Audit Bureau of Circulations or Business Publications Audit of Circulation, Inc... serving and promoting the Business Press of America... bringing thousands of pages of specialized knowl-

how and advertising to the men who make decisions in the businesses, industries, sciences and professions... pin-pointing your audience in the market of your choice. Write for list of NBP publications and the latest "Here's How" booklet, "How We Use the Business Press and Why" by William C. Sproull, Director of Advertising of the Burroughs Corporation, Detroit.



Metalworking News in Brief

Gilbert Haller Turner, director of industrial relations for The Timken Roller Bearing Co., Canton, Ohio, died recently at 48 years of age. Mr. Turner had been associated with Timken for 26 years and had handled the firm's labor negotiations for more than a decade, being supervisor of labor relations for five years before assuming the industrial relations post.



THE BEST COSTS YOU NO MORE!

CONSIDER THESE ADVANTAGES—

1. Tapered drive assures concentric operation.
2. Special Surface Treatment for longer life.
3. Premium Grade H.S.S.
4. Large Centers for outboard support.
5. COSTS NO MORE THAN REGULAR WOODRUFF CUTTERS.

Write for prices and literature—
jobber and agent inquiries welcome

QUALITY TOOL WORKS

792 S. Market

Waukegan, Ill.

John M. Horvath, 60 Stillson Rd., Fairfield, Conn., has been appointed a direct factory representative by Hy-Pro Tool Co., New Bedford, Mass. Mr. Horvath will cover metropolitan New York City and northern New Jersey.

— o —

Robert L. Bell, formerly superintendent of metals, Carboloy Department of General Electric Co., Detroit, Mich., has been appointed manager of manufacturing engineering. Mr. Bell joined Carboloy in 1939.

— o —

A. Schrader's Son, Brooklyn, N. Y., manufacturer of pneumatic tire valves and air control equipment, has announced that its California branch has moved to 6464 Flotilla St., Los Angeles 22, California.

— o —

Gierston Tool Co., Elmira, N. Y., has been appointed distributor of Johnson's Wax industrial lubricants for the southern tier of New York State by S. C. Johnson & Son, Inc., Racine, Wisconsin.

— o —

The advancement of Frank T. Goll to the post of assistant sales manager has been announced by C. A. Norgren Co., Englewood, Colo., manufacturer of a broad line of pneumatic products. Mr. Goll has been head of the order department and closely associated with home office sales activities at Norgren for the past 18 months.

349 MIDLAND AVENUE • DETROIT 3, MICHIGAN

Metalworking News in Brief

John S. Barnes Corp., Rockford, Ill., has announced several changes in its sales personnel. **Tom W. Burnes** is now associated with the firm's eastern office located in Trenton, New Jersey. Mr. Burnes will represent the company in the New England division of the eastern territory. A new factory branch office has been established at 2333 W. Wells St., Milwaukee, Wis., with **Bert McCleneghan** in charge. Mr. McCleneghan is also manager of the Chicago sales office. **Keith Struthers** has also been assigned to the Chicago office.

— o —

Crucible Steel Company of America, Pittsburgh, Pa., has announced the retirement of **James F. Prince** as treasurer of the company. Mr. Prince's retirement comes after 14 years of service with Crucible. The company has announced that **Frank L. Cooper** will succeed Mr. Prince.

Adamas Carbide Corp., Kenilworth, N. J., has announced the appointment of the following sales representatives: **William C. Harper**, 7606 Reading Rd., Cincinnati, Ohio, for southern Ohio and eastern Kentucky; **R. C. Dombrow Co.**, 5221 W. Belmont Ave., Chicago, Ill., for northern Illinois and northern Indiana; **Pierce Frauenheim**, 4920 Penn Ave., Pittsburgh, Pa., for western Pennsylvania.

— o —

Charles E. Vanderpool has been promoted to the position of sales manager for the Rotor Tool Co., Cleveland, Ohio. Mr. Vanderpool joined the company in 1947.

— o —

At a recent meeting of the board of directors of Logansport Machine Co., Inc., Logansport, Ind., **Mrs. E. P. Wilkinson** tendered her resignation as president and was elected chairman of the board. **C. H. Wilkinson** was elected president.

CUT ... operating — maintenance — spoilage COSTS! ON YOUR TAPPING JOBS!

Procnier tappers are the solution to steadily rising production costs on many tapping operations. They have the unique construction features that permit inexperienced operators to tap like experts. In addition, they provide many extra hours of continuous, accurate tapping without frequent "down-time" interruptions, producing more pieces with fewer rejections, less spoilage and a minimum of broken taps.

Check these advantages: New sensitive double cone friction clutch; soft cushioned action driving pressure; ball bearing equipped; heat treated gears; special balanced gear reversing mechanism, plus many others.

Write for free brochure giving full details on the complete line of Procnier Tapping Heads.

PROCUNIER Safety Chuck Co.,



Exclusive
"Tru-Grip"
Tap Holder

smaller, lighter, more accurate, taps close to walls.

12 South Clinton Street,
Dept. 11, Chicago 6, Ill.

Metalworking News in Brief

The Torrington Co., Torrington, Conn., has announced the appointment of **Walter St. Onge, Jr.**, as advertising manager, succeeding his father whose planned retirement this fall concludes more than 31 years of service with the company.

— o —

Benchmaster Mfg. Co., Gardena, Calif., has announced the appointment of **Camley International Co., Inc.**, 1263 Westwood Blvd., Los Angeles 24, Calif., to handle world-wide foreign sales in over 40 foreign countries.

— o —

The Taft-Peirce Mfg. Co., Woonsocket, R. I., has announced that **Cowan Supply Co.**, 124 Walker St., S.W., Atlanta, Ga., will be its manufacturer's agent for the state of Georgia, handling T-P's lines of gages, magnetic chucks and toolroom equipment.

William L. Peck has been named advertising and sales promotion manager for The Raymond Corp., Greene, N. Y., succeeding **Carl F. Kellogg** who will devote full time to his duties as assistant to the president.

— o —

The Fellows Gear Shaper Co., Springfield, Vt., has announced that **Arthur Tobin** of the New York office has succeeded **Stewart Barton** as central district manager, with headquarters in Detroit, Michigan. Mr. Barton will devote full time to his duties as assistant sales manager.

— o —

J. H. Williams & Co., Buffalo, N. Y., has announced the appointment of **Dale Bethke** as sales representative for the state of Michigan. Mr. Bethke has represented Williams for a number of years in Oklahoma, Arkansas and Louisiana and will now make his headquarters in Detroit.

PROSSER CARBIDE TOOL GRINDERS

FOR ALL SINGLE POINT TOOLS

• ADVANTAGES:

1. Quick-acting indexing tables give exact angles—"Stay put."
2. Wet grinding eliminates heat cracking of tools — gives longer life—faster grinding.
3. Greater accuracy. Precision angle setting—precision ball bearings.
4. Versatility. Any combination of carbide, oxide, or diamond wheels.
5. Moderate-priced quality machinery.



← Model AW Wet Grinder

New machine—a real wet grinder with coolant pump — at a modest price.

Famous for dry grinding — a complete carbide tool grinder at lowest cost.

WRITE FOR LITERATURE

THOMAS PROSSER & SON
114 WALL STREET • NEW YORK 5, N. Y.

Metalworking News in Brief

Hanna Engineering Works, Chicago, Ill., has announced the appointment of two southern firms as sales representatives. Barker Instrument & Machine Company has been selected to serve both of the Carolinas. **John Barker** heads the office located at 2316 Central Ave., Charlotte, N. C., and **Harold Barker** is in charge of the office at North Park Rd., Greenville, S. C. Exclusive representative for Hanna's entire line of air and hydraulic cylinders and valves throughout the State of Georgia is Carl B. Pederson Co., 181 Forest Ave., N.E., Atlanta, headed by **Carl Pederson**.

— O —

Verson Allsteel Press Co., Chicago, Ill., has announced the appointment of **Paul Kjelstrom** as manager of the service and parts division of the company. Associated with Verson since 1942, Mr. Kjelstrom was formerly chief engineer of production engineering. **Jack Steinhardt** has been appointed to the post of assistant manager of the service and parts division.

The Gear Grinding Machine Company and Republic Gear Company, both of Detroit, Michigan, have jointly announced that Geargrind has acquired all of the assets of the Republic Gear Company and its wholly owned subsidiaries, Detroit Bevel Gear Company and Almetal Universal Joint Company of Cleveland. The transaction was made for an estimated \$2,700,000, which includes all assets except certain items that do not affect the operation.

MODEL 1220



KALAMAZOO

METAL CUTTING BAND SAW

big, rugged, built for heavier production

MODEL 8C
Cuts 8" round, 16" flat, 8" pipe.

MODEL 610
Cuts 6" round, 10" flat.

KALAMATIC AUTOMATIC BAR FEED ATTACHMENT for Kalamazoo Metal Cutting Band Saws.

Cuts 12" round, 20" flat stock. Accurate to thousandths of an inch, minimum burr and kerf. Four cutting speeds, four blade-tension adjustments for better sawing, longer blade life. Safety-designed throughout—only cutting section of saw blade is exposed. Positive power from heavy duty 1 HP motor. Available with coolant equipment.

Ask your dealer for details and demonstration.

MACHINE TOOL DIVISION

Kalamazoo TANK and SILO CO.

1110 HARRISON ST., KALAMAZOO, MICHIGAN

Fire Destroys Portion of O. J. Heimann Manufacturing Company

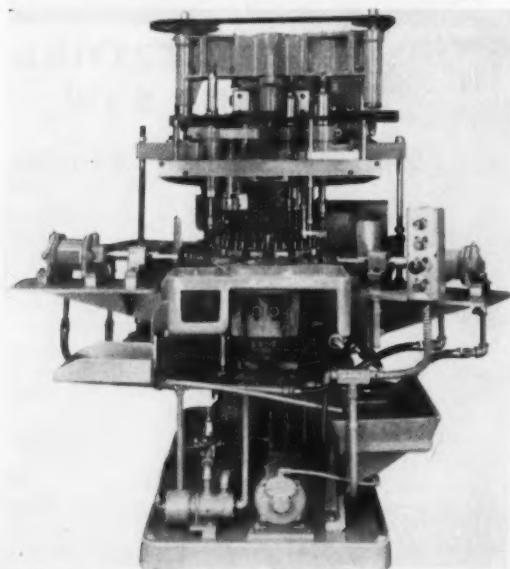
O. J. Heimann Mfg. Co., Urbana, Ohio, has announced that a recent fire destroyed a portion of its plant which houses the manufacturing facilities. While manufacturing operations will be halted temporarily, the company will continue making prompt shipments of orders from its warehouse stocks which were not harmed by the fire. The firm manufactures transfer screws for use in leader pin commercial die sets and other machine shop applications.

Turret Lathe Tools. The Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio, has released the seventh edition of its Turret Lathe Tool Catalog, a 197-page book containing illustrated listings of W&S stand-

ard tools, chucks, collets and miscellaneous equipment. Designed to explain in full how each tool works and the jobs for which it can be used, the booklet is available without charge to purchasing agents, tool designers, engineers, time-study men, superintendents, foremen, operators and set-up men who write the company requesting a copy. All the information and data about each tool appears on one page.

Detailed tool dimensions and clearances, spindle nose, cross slide and hex turret dimensions, as well as complete data sheets for all W&S turret lathes, make the job of tool designing and setup much easier. The catalog also discusses the problem of reducing production time and tooling cost. A permanent setup of universal chucking and bar equipment is presented as one approach to the problem of cost reduction.

Machine Tooled for Mass Processing Three Different Parts



FACED with the problem of mass processing three different parts having 22 variations in size and hole positions, Bodine Corporation engineers were able to tool up the company's standard Model 41-20 automatic multiple spindle drilling and tapping machine to handle the production of all three parts. To save an extra handling step, the machine, as shown herewith, incorporates a horizontal and vertical milling spindle to permit a light milling operation to be combined with drilling and tapping. The three different parts processed with this machine include a needle valve, high speed nozzle, and float valve seat, all of which are intended for use in marine outboard motors.

Book Reviews

The Physics of Experimental Method. By H. J. J. Bradwick. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 404 pages. Cloth binding, board covers. Price, \$7.00.

Written for those who plan experiments or design apparatus in such fields as engineering, chemistry, biology, mineralogy and medicine, this book emphasizes the principles of physical experiment, the currently available resources and the limitations of contemporary technique. The author is therefore concerned with the statistical analysis of errors, the reduction of observation and the essential dependence of physical measurement on the properties of various key materials and of their proper use in the construction of apparatus or in the design of instruments. The book includes discussions on errors and the treatment of experimental results, mechanical design, construction materials, vacuum technique, electrical measurements, electronics, optics and photography, the natural limits of measurement and some techniques of nuclear physics.

Alternating Current Machines. Third Edition. By A. F. Punctionstein, T. C. Lloyd and A. G. Conrad. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 721 pages. Cloth binding, board covers. Price, \$8.50.

Describing construction, principles of operation, methods used for making and working up tests and simple methods for predicting behavior, regulation and performance, this third edition introduces significant new changes while retaining most of its original form. The authors have modified the approaches to the theories of some of the machines, and provide more detailed developments of equivalent circuits, vector diagrams, methods of calculating the cross-axis voltages of synchronous machines and the equations describing the oscillations of synchronous motors. Both the double revolving theory and the cross-field theory have been retained for the single-phase induction motors, and additional material has been added in the latter to clarify the polarities of the transformer and speed voltages. New material is also provided on adjustable-speed drives, rectifiers and self-synchronous machines. Methods of determining the constants of synchronous machines have been added, and the authors explain the nature of short-circuit currents in alternators.

For Your Convenience . . .

the "Where to Get It" section of MODERN MACHINE SHOP provides a quick reference to machinery, tools and supplies advertised in the current issue. Use it consistently. You'll find it's very helpful. (See pages 416, 418, 420 and 422.)

MODERN MACHINE SHOP
431 MAIN STREET • CINCINNATI 2, OHIO

where
to get it

(Numbers shown are page numbers in this issue)

— A —

Abrasives. Grain, Cloth, Paper, Disc., etc., 40,
89, 96c, 96d, 218, 219, 298
Absorbents, Oil and Grease. 388
Adapters. 28, 60, 61, 70, 190
Air Operated Equipment (Look for specific item)
Alloys. 316
Angles. 102, 103, 346, 390
Automated Equipment (Look for specific item)

— B —

Balancers. 355
Balancing Machines. 83
Balancing Ways. 355
Bar Feeds. 321, 413
Barrels, Tumbling. 212
Bases, Index. 288
Bases, Machine. 338
Bases, Magnetic. 395
Bearings, Ball. 25
Bearings, Bronze. 159, 303
Bearings, Motor. 303
Bearings, Roller. 25
Bearings, Sleeve. 159, 303
Bearings, Thrust. 25
Bench Tops. 336
Benches, Work. 305
Bending Devices. 248, 342
Bending Machines. 91, 94
Bins. 344
Blades, Cutting-Off. 62, 264
Blocks, Magnetic. 65
Blocks, V. 65, 346
Bolts. 114, 361, 367
Boring Bars. 191, 275
Boring, Drilling and Milling Machines, Horizontal. 95
Boring, Drilling and Tapping Machines, Multiples. 84
Boring Heads. 45, 75, 275, 367
Boring Machines. Second Cover
Boxes, Shop. 366
Boxes, Stacking. 366

Brakes, Press and Bending. 92, 108, 109, 155,
196

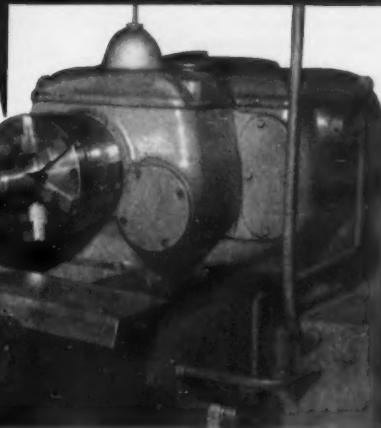
Broaches. 386, 403
Broaching Fixtures. 386
Broaching Machines. 39
Bronze Bars. 159, 303
Buffers, Portable Pneumatic. 38
Buffing Machines. 383, 433, 436
Burners, Rubbish. 352
Burs. 299, 378
Bushings, Brass, Bronze, etc. 281, 303
Bushings, Drill Jig. 281, 306, 332, 408
Bushings, Pilot. 384

— C —

Calipers. 326, 335
Cams. 326, 360, 363, 367
Castings. 403
Centers, Lathe, Planer, Miller, etc. 220, 244,
304, 329, 359, 361, 401
Chasers. 167
Chilling Equipment, Industrial. 297
Chucking and Indexing Fixtures, Combination.
387
Chucks, Air and Hydraulic. 177, 421
Chucks, Collet. 29, 60, 61, 300, 421
Chucks, Drill. 34, 107
Chucks, Internal. 262
Chucks, Lathe. 417
Chucks, Magnetic. 102, 103
Chucks, Tap. 421
Clamp Components. 368, 371
Clamps. 32b, 114, 285, 368, 376, 396
Clinching Machines. 241
Clutches. 290
Coil Handling Equipment. 46, 96d, 249
Collets. 60, 61, 371
Comparators. 102, 103, 369
Compressors, Air and Gas. 38, 113
Controlling Devices. 215, 227
Coolant Separators. 47, 197
Coolants. 173
Counterbores. 73, 85, 98, 145, 207
Countersinking Machines. 352
Countersinks. 207, 282
Couplings, Air. 215
Cut-Off Machines. 343



Buck .0005"
PRECISION
...A FAVORITE with
SUPERINTENDENTS



Buck



PAT. NO. 2,639,157

CHUCKS

Only universal scroll chuck with .0005" precision — for lathes, grinders, dividing heads, screw machines.

3-jaw and 6-jaw in 4", 5", 6", 7½", 9" sizes. 2-jaw Aviation chucks, for odd-shaped parts, in 6", 7½", 9" sizes.

ALSO SUPER-GRIP 4-JAW INDEPENDENT CHUCKS FOR 9" to 16" LATHES.

LOW COST PRODUCTION on Lathes - Grinders

Buck Ajust-Tru 7½" chuck turns bar stock and shafts to consistent precision at The Set Screw & Mfg. Co., Bartlett, Illinois.

Shop superintendents everywhere report their satisfaction with the way these universal scroll chucks cut machinists' time, line up *dead true* in one minute, hold to within .0005" re-chucking precision on duplicate parts. Some report cost savings of up to 50% per operation. The Buck chuck ends most needs for stub arbors, mandrels, special fixtures . . . adapts to lathes, screw machines, grinders, dividing heads.

Make your next chuck a Buck. It will save money every time you use it. Send for latest catalog.

BUCK TOOL COMPANY
 1114 SCHIPPERS LANE • KALAMAZOO, MICH.

where to get it

(Numbers shown are page numbers in this issue)

Cutters, Milling. 58, 64, 73, 85, 145, 175, 231, 239, 241, 282, 353, 377, 410

Cylinders, Hydraulic and Pneumatic. 72, 177, 215, 241, 287, 374

— D —

Diamond Powders. 399

Diamond Wheels. 218, 219, 391, 399

Diamond and Diamond Tools. 399

Die Cushions, Pneumatic. 92

Die Flippers. 329

Die Heads. 167

Die Making Machines. 86

Die Sets. 44

Dies, Punching or Forming. 4, 196, 251, 327, 359, 390

Dies, Threading. 73, 85, 250, 259

Dividing Heads. 87, 308

Dogs, Lathe, Grinder, and Miller. 114

Dressing Fixtures, Grinding Wheel. 32b, 329, 348

Drill Dispensers. 274

Drill Heads. 87, 257, 284, 331, 364

Drilling Machines, Bench. 104, 105, 181

Drilling Machines, Radial. 66, 67, 82, 100, 101, 104, 105, 151, 261

Drilling Machines, Upright. 100, 101, 151

Drilling Machines, Sensitive. 71

Drilling Machines, Vertical. 56, 57, 82, 104, 105, 161, 277, 352

Drilling and Tapping Machines, Combination. 375

Drilling Units. 54, 55, 380

Drills, Center, Core, Twist, etc. 73, 85, 145, 207, 231, 310, 394, 398

Drills, Portable Electric. 37, 341

Drills, Portable Pneumatic. 341

Drives, Drill and Tap. 70

Dust Control Equipment. 52, 158, 384, 436

— E —

Ejection Sets, Air. 215

Ejectors, Tool. 60, 61

End Mills. 6, 73, 85, 145, 239, 282, 312

Engines. 113

Engines, Diesel. 38

Envelopes, 347

Etchers. 357

Extensions. 28

— F —

Facing and Chamfering Machines. 23

Facing Heads. 373

Feed Units. 195, 249, 349, 351, 379

Feeler Stock. 410

Files. 33

Filters. 47, 149, 197, 307

Flexible Shaft Equipment. 82, 211, 378

Floats. 201

Forming Machines. 96a, 249

Furnaces, Heat Treating. 59, 208, 210, 286, 347, 365

— G —

Gage Blocks. 74, 168, 419

Gages. 18, 35, 63, 74, 77, 102, 103, 167, 189, 215, 271, 309, 349, 355, 357

Gear Cutting Machines. 5

Gear Measuring Instruments and Machines. 74

Gear Shapers. 12, 13

Gears and Gear Units. 64, 371, 382

Grinders, Abrasive Band and Belt. 165, 365

Grinders, Air. 38, 354

Grinders, Bench. 351, 383

Grinders, Carbide Tool. 3, 106, 412

Grinders, Centerless. 8, 9

Grinders, Chamfer. 337

Grinders, Cutter and Tool. 41, 86, 97, 153, 161, 313

Grinders, Cylindrical. 8, 9, 89, 106, 218, 219

Grinders, Disc. 433

Grinders, Drill. 41, 79, 86, 337, 363, 433

Grinders, Face Mill. 86

Grinders, Flute. 337

Grinders, Internal. 106

Grinders, Jig. 329

Grinders, Knife and Shear. 160

Grinders, Pedestal. 383, 433, 436

Grinders, Portable Electric. 240

Grinders, Saw. 160, 370

Grinders, Spindle. 373

Grinders, Surface. 10, 30, 41, 51, 78, 96, 102, 103, 106, 165, 311, 389

Grinders, Tap. 337, 347

Grinders, Thread. 399

Grinding Coolants. 175

Grinding Fixtures and Attachments. 43, 240, 433

Grinding Heads. 87

Grinding and Polishing Machines, Combination. 165

Grinding Wheels. 89, 163, 218, 219

Guns, Air. 215, 256, 307

— H —

Hand Tools, Power (look for specific item)

Handles, Hammer. 300

Hardness Testing Devices. First Cover

Hinges. 330

Hob Sharpening Machines. 178, 179

Hobbing Machines. 178, 179, 183

Hobs. 64, 85, 145, 178, 179, 231

Hoisting and Conveying Machinery. 397

Holders, Tap. 411

Holders, Tool. 60, 61, 70, 114, 264, 266, 359, 382, 390, 421

Hones, Diamond. 399

Hose, Air. 215

Hose Assemblies. 149, 215

Hydraulic Equipment (Look for specific item)

Webber PRESENTS

**The New, All-Purpose,
Heavy-Duty
84 Block Gage Set**

A COMPLETE GAGING SYSTEM



Here, in a single package, are the 84 gage blocks and the accessories required to constitute a complete gaging system. It will fully meet the exacting requirements of the vast majority of manufacturers of precision products.

Webber Heavy Duty gage blocks are generously proportioned ($\frac{1}{2}'' \times 1\frac{1}{2}''$) in order to insure maximum resistance to wear, with resultant long life. In addition to their normal gaging function, the blocks, used with the proper fixtures, (included in the set) will assemble into dividers, scribes, height or snap

gages, thus making them especially valuable for layout or inspection work. When assembled with the required number of six inch blocks, any desired length can be obtained.

84 Block H.D. Set—accuracy, $\pm .000004''$, complete with accessories.
As illustrated **\$57500**

84 Block H.D. Set—accuracy, $\pm .000004''$, without accessories,
with case **\$49500**

6.000" Block with eccentric clamp **\$3575**

Webber GAGE COMPANY

12899 Triskett Road • Cleveland 11, Ohio



Largest Exclusive Manufacturers of Precision Gage Blocks

where to get it

(Numbers shown are page numbers in this issue)

— I —
Indicators, 35, 189, 238, 271, 309, 335

— J —
Jacks, 114
Jig Borers, 100, 101, 329, 351, 356
Jigs and Fixtures, 279, 400
Joints, Universal, 70

— K —
Keys, Fixture, 285
Keys, Machine, 353, 369
Keys, Woodruff, 353, 369
Keyway Cutting Machines, 347, 348, 362
Knees, Toolmakers', 346
Knives, Band, 309
Knobs, Hand, 356
Knurls, 250

— L —
Lapping Machines, 8, 9, 10, 97, 102, 103, 235
Lathe Attachments, 282
Lathes, Automatic, 83
Lathes, Bench, 56, 57, 161, 295, 328
Lathes, Engine and Toolroom, 16, 17, 19, 48, 49, 76, 104, 105, 161, 209, 245, 261, 270, 295, 301, Third Cover
Lathes, Tracer, 90, 233
Lathes, Turret, 7, 83, 161, 171
Lathes, Vertical Turret, 53
Layout Materials, 194, 367
Levels, 102, 103
Light Wave Measuring Equipment, 74
Lighting Equipment, 296, 350, 395
Locating Tools, 329
Locking Devices, Jig and Fixture, 318
Lubricants, 357
Lubricators, 149

— M —
Magnets, Lifting, 42
Magnifiers, 393
Mandrels, Expanding, 421
Marking Devices, 32, 276, 326, 355, 384, 399
Metalizing Equipment, 265
Micrometers, 35, 74, 309, 335, 353, 386
Microscopes, 371
Milling Fixtures, 206
Milling Heads, 87, 99
Milling Machines, Bench, 46, 315, 431
Milling Machines, Hand, 315
Milling Machines, Vertical, 56, 57, 245
Mills, Pipe and Tube, 96a
Motors, 237

— N —
Nails, 50
Nibblers, 318, 390
Nut Setters, Portable Electric, 187
Nuts, 190

— O —
Oilers, 215
Oils, Cutting, 143
Oils, Soluble, 175, 199

— P —
Pads, Toggle, 285
Pans, Tote, 388
Pantographs, 88, 283
Parallels, 65, 346, 390
Parters, Rod, 318
Partitions, Wire Mesh, 431
Parts, Machine Tool Production, Aircraft, etc., 251, 306, 317, 353
Pins, Dowel, Taper, etc., 281, 353, 361, 369
Pins, Stop, 296
Pipe and Stud Extractors, 359
Plates, Angle, 346, 371
Plates, Lapping, 346
Plates, Screw, 73, 259
Plates, Surface, 102, 103, 243, 305, 346, 363, 390
Plungers, Spring, 285
Pointers, Bar, 352
Polishers, Portable Pneumatic, 38
Positioning Machines, Automatic, 100, 101
Power Units, Hydraulic and Pneumatic, 177
Presses, Air, 177, 374
Presses, Arbor, 229
Presses, Foot, 249
Presses, Hydraulic, 92, 177, 229, 253
Presses, Power, 80, 81, 351
Presses, Punch, 31, 46, 92, 253, 314, 324, 334, 351, 372, 407
Presses, Sub, 330
Pumps, Coolant and Lubricant, 177, 278, 402, 429
Pumps, Liquid Transfer, 278
Pumps, Vacuum, 38
Punches, 251, 310, 318, 327, 359
Punches, Hand, 310
Punching Machines, 319

— R —
Racks, Machine, 369
Racks, Storage Bin, 344
Reamers, 73, 85, 145, 178, 179, 207, 221, 231, 260, 280, 398
Reels, 96d, 215, 249
Refractories, 89, 218, 219
Regulators, 149, 215, 307
Riveting Machines, 241, 314
Rivets, 50
Rolling Mills, 253
Rolls, Bending, 319
Rolls, Threading, 250
Rust Preventatives, 400

— S —
Sandblast Equipment, 358
Sanders, Portable Pneumatic, 38



Congratulations to
Caterpillar Tractor Co.
on their "50 Years on
Tracks" Commemora-
tion. We are proud to
serve them.

ERICKSON MANDRELS

help improve CATERPILLAR® track roller bushing quality
... and speed production!

When Caterpillar Tractor Co. completely revised their method of machining Track Roller Bushings, Erickson mandrels were selected to hold the bushings during rough and finish turn, face and form operations.

Erickson mandrels used in some present bushing machining methods at Caterpillar are accurate, quick acting and dependable. Bushing production has been increased and quality improved. Erickson mandrels have contributed to these improvements.

Because of their quick action, automatic release, positive alignment and guaranteed accuracy within .0005" T.I.R., both Erickson mandrels and collet chucks have helped to speed production and improve quality in every installation. Why not let an Erickson sales engineer give you a free demonstration. Write or call today!

A.A.-576



Multiple spindle lathes equipped with Erickson mandrels machine track bushings at Caterpillar Tractor Co.



ERICKSON TOOL COMPANY

2304-N Hamilton Avenue • Cleveland 14, Ohio

COLLET CHUCKS • FLOATING HOLDERS • TAP CHUCKS • TAP HOLDERS • AIR-OPERATED CHUCKS
EXPANDING MANDRELS • SPECIAL HOLDING FIXTURES

where to get it

(Numbers shown are page numbers in this issue)

Saw Blades, Band. 214, 309
Saw Blades, Circular. 175
Saw Blades, Hack. 214, 252, 309, 340
Saw Frames, Hack. 252
Saw Sharpening Machines. 160, 370
Sawing Machines, Band. 22, 82, 225, 252, 291, 392, 413
Sawing Machines, Friction. 319
Sawing Machines, Hack. 31, 93
Saws, Portable Electric. 213
Screw Drivers, Portable Electric. 187
Screw Driving Machines, Power. 349
Screw Machines, Automatic. 14, 84
Screw Stock, Steel. 273
Screws, Cap, Set, Socket, and Machine. 50, 110, 111, 251, 269, 289, 361, Fourth Cover
Screws, Thumb. 285
Screws, Transfer. 308, 394
Services: Milling, Grinding, Lapping, Rebuilding, Repairing, Business, etc. 193, 326, 356, 360, 363, 367, 382, 398, 403, 424
Shapers. 31, 82, 108, 109, 161, 242, 301
Sharpening Fixtures. 167
Sharpening Wheels, Brass. 157
Shearing Machines. 80, 81, 108, 109, 319
Shearing, Punching, and Coping Machines, Combination. 319
Shears, Hand. 360
Shears, Portable Electric. 263
Sine Bar Fixtures. 32b
Sleeves. 60, 61, 70
Slings. 349
Slitting Machines. 96a
Slotting Heads. 87
Slotting Machines. 352
Sockets. 28, 60, 61, 70, 114
Spacing Fixtures. 267
Special Machinery. 24, 83, 245, 253
Speed Reducers. 371
Spindles: Grinding, Boring, Milling, etc. 70, 193, 320, 323
Spot Facing Machines, Back. 10
Spring Coilers. 345
Spring Winders. 310
Steel Stock, Ground Flat. 309
Steel, Tool. 26, 27, 68, 69, 164
Stops, Finger. 296
Stops, Spring. 285
Storage Cribs. 431
Straightedges. 346, 390
Straighteners, Stock. 246
Straightening Machines. 245
Strainers, Air. 215
Studs. 361
Superfinishing Machines. 83
Surface Finish Standards. 337
Surfacing Machines, Abrasive. 82
Swaging Machines. 36

— T —

Tables, Elevating. 185
Tables, Machine. 66, 67, 87
Tables, Rotary and Index. 11, 195, 257, 371, 379, 408
Tap Extractors. 359
Taper Attachments. 356
Tapes, Measuring. 309
Tapes, Pressure Sensitive. 89, 218, 219, 298
Tappers, Hand. 360
Tapping Attachments. 339, 381
Tapping Compounds. 394
Tapping Heads. 284, 364, 381
Tapping Machines. 348, 365
Taps. 15, 63, 73, 85, 144, 217, 236, 259
Thread Rollers, Automatic. 250
Threading Attachments. 250
Threading Machines. 2, 352
Tool Bits. 216
Tool Cribs. 431
Tool Posts, Turret. 373
Tool Tips, Carbide. 266
Tools, Boring. 45, 275
Tools, Broaching. 386
Tools, Carbide. 207, 231, 280, 299, 322
Tools, Cutting-Off. 325
Tools, Dressing. 399
Tools, Engraving. 399
Tools, Facing. 234
Tools, Form. 403
Tools, Profiling. 317
Tools, Radius. 342
Tools, Special Cutting. 32a, 85, 145, 207, 280, 317
Tools, Threading. 371
Tools, Turning. 399
Transfer Processing Machines, Automatic. 84
Traps, Air and Steam. 201
Triangles, Shop. 74
Trunnions, Indexing. 88
Tube Fittings. 177, 215
Tube Mills. 96a
Tubing, Tool Steel. 247, 423
Turrets, Lathe, Tool Post, Bed and Tailstock. 371

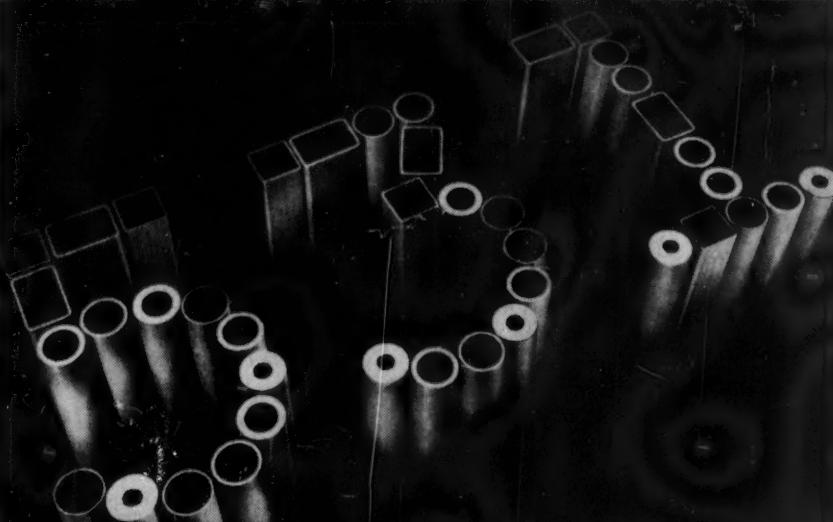
— V —

Valves. 149, 177, 201, 215, 287, 333, 374
Vises, Bench and Machine. 32b, 268, 307, 318, 345, 369, 398

— W —

Washers. 302
Welding Equipment and Supplies. 198, 385
Wipers, Industrial. 20, 21
Wire Mesh Partitions. 431
Wire Straighteners. 249
Wires, Measuring. 74
Wrenches. 114

WHY IT PAYS TO BUY MECHANICAL TUBING FROM US



You have 531 sizes to choose from!

WE carry no less than 531 sizes of Shelby Seamless Mechanical Tubing and can fill orders promptly . . . by the inch or by the carload. No matter what your tubing needs, we can supply you with the best for the job—tubing manufactured by the world's leading producer, National Tube Division of United States Steel.

Our experience in the field of tubing applications has often saved large sums of customers' money—for it is sometimes possible to substitute a more economical type of tubing than you had planned to use.

We carry everything you need. Call us for: mechanical tubing, round and square, seamless and welded; boiler tubing, pressure tubing and pipe; stainless steel tubing, seamless and welded, and stainless pipe.

TRIPLE SECURITY

What you want
When you want it
At the right price

U. S. STEEL SUPPLY DIVISION



General Offices: 208 So. La Salle St., Chicago 4, Ill.
Warehouses and Sales Offices Coast to Coast



UNITED STATES STEEL

services directory

grinding
stamping
tool and die work
machine work
castings
heat-treating
forgings
employment
business, etc.

STATISTICAL QUALITY CONTROL



To ensure uniform high quality and closer tolerances, American Non-Gran Bronze uses statistical quality control in its contract machine work. Learn what this can mean to your product. Write! AMERICAN NON-GRAN BRONZE Co., Berwyn, Pa.



Write for book "Our Story in Pictures"

GRIND THE *Eastern Centerless Way*

Our new plant with
increased facilities
assures

PROMPT SERVICE

Eastern Centerless Grinding Co.
470 Tolland Street East Hartford 8, Conn.

MANUFACTURERS

Are you represented in Oakland and Macomb Counties, Michigan? We are situated in the center of this new and rapidly expanding industrial area north of Detroit. We are a reputable dealer with 25 years experience in selling new and used machinery, and are interested in the representation of new machine tools and accessories. We invite your correspondence.

R. A. VINE, INC.
120 E. Hudson Avenue Royal Oak, Michigan



Masters VERTICAL MILLER

ONLY
\$695.00

A NEW DESIGN
made exclusively for us in Sweden

Mills, Drills, Bores and Reams at all angles, **one set-up**.

Swivel Head, 8 Speeds, 125 to 1540. Heavy Duty 1 H.P. Motor. 11" Longitudinal travel on table, 6½" cross feed travel.

DEALERS TERRITORIES OPEN

Masters

3613 ARCHER AVE., CHICAGO 9, ILL.
118 CHURCH ST., NEWTOWN, OHIO

Miss Shapely in the shop

By J. A. Patterson



**"I don't see how you keep from taking your death of cold
in this awful draft back here."**

the last word

Next Month

A GREAT amount of the planning for an issue of a magazine is usually done many weeks and sometimes months before the actual publication date. As a result of this prior planning, we now have a good idea of what the readers of *Modern Machine Shop* may expect to find in the December "Services for Sales" issue—the first of its kind, to the best of our knowledge, ever to be undertaken by a metalworking publication.

First of all, one of the most important parts of our job is that of rendering service in the form of supplying information as to where the best metalworking equipment and supplies may be obtained. The manufacturers of this equipment and these supplies, on the other hand, provide many services to assist those who purchase or who are thinking of purchasing the manufacturers' products.

The feature editorial section of the December issue will contain a number of interesting stories describing the sales and training services which are available from several manufacturers for helping you to do your job just a little bit better. In addition, a concise listing of services rendered by many manufacturers will be included.

The Services for Sales issue is designed to help those who buy and those who sell. We think you will find the issue unusual and highly informative. Don't fail to read it when you receive your copy.

Remarks That Remind Us

WHEN the field-dog kennel-dog controversy was raging last month we recalled to mind a rather pertinent piece of writing which we had the privilege of reading several years ago. Digging back into our files, we found the piece. It was entitled "The World Owes Who a Living," published in the March 1949 issue of *The Lever*, a publication of Lewis-Shepard Products Incorporated. The author wrote:

Just who is the world, anyway?

Is it God, or Nature, or the planet on which we live? If any or all of these, the debt was paid before we were born.

The air we breathe, the water we drink, the magic of nature which provides our food, shelter and clothing; the sun to warm us, the trees for shelter and shade, and the stars to guide us, are all free gifts to man at birth.

These provide, without cost, all that man needs to live by, save one thing—WORK. That is as necessary as the others.

Work must be man's contribution. And upon the earnestness and quality of that work will depend what we call success.

Some say that it is society which owes man a living. But, who is society? Society can only be people. Can it be that other people owe any man a free living?

We are entitled to ask what this man has done for society which entitles him to such charity. Society does owe a livelihood to those who, for reasons beyond their control, are unable to provide their own—and it supplies it.

But Society owes nothing to a man who will not do his best to work out his own living, and to pay it under such conditions is to weaken the fiber of the nation at its very roots.

Do Unto Others

THE production executive has no more important responsibility today than that of improving labor relations is the statement of Charles E. Smith, Jr., President of Steel Improvement & Forge Company, before the manufacturing conference of the American Management Association at its recent meeting in New York.

Companies with good labor relations, according to Mr. Smith, are companies where management has made an effort to explain the reasons behind the decisions that directly affect the individual employee. "Most of the labor troubles today could be avoided if the employees affected were convinced, in their own minds, that the motives of management are sincere and honest and that they were being dealt with as fairly as was humanly possible."

Mr. Smith offers several suggested methods which he practices in his own organization. Make a determined effort to humanize the top brass. Get the company president or board chairman to spend a little time in the shops. Review all of the principles that have been established governing labor relations to insure that they are fundamentally sound. Treat employees as individuals rather than as a group. Send employees periodic newsletters to inform them of business conditions, the company outlook, the progress of various projects, and the year-end financial statement. Hold open houses for employees and their families. Train foremen in the art of communication.

The aim of all management effort should be to diligently try to see that each employee is fairly treated. If this is achieved, then no serious trouble will

ever develop between labor and management.

Research and Jobs

THE greatest reservoir of opportunities for new jobs and one of the strongest factors toward stabilized production in the future lies in industrial research and service laboratories. In fact, research is "the breeding ground for new jobs." That's the way the DuPont Company puts it, and the great chemical company is passing along this firm belief to its employees.

The point is made in a letter to employees in which DuPont relates the progress being made on 10 new research laboratories which recently have been completed or are now being built.

Automation

SPAKING at a recent conference on automation, Del S. Harder, vice-president of manufacturing for Ford Motor Company, pointed out that the current ominous predictions from some quarters that automation will cause unemployment also were made about mass production and all of the other significant advances in manufacturing. Automation will do just the opposite. It will create more jobs—create more products at less cost—and increase the ability of people to consume. It is the key to less human effort in the future and an increase in our standard of living tomorrow.

Automation assists in lowering production costs by relieving manual effort and by enabling machines to operate nearer their maximum rated capacities. Workers benefit by obtaining less monotonous and boring and, consequently, much more interesting and more highly skilled jobs. Product quality is improved by built-in inspection gages and by automatic handling which prevents damage to parts.

Automation, in short, is destined to cause changes—changes, for the most part, for the better.

index to advertisements

(For listing of products offered by these advertisers consult Where To Get It section)

— A —

Abrasive Machine Tool Co.	311
Ace Drill Bushing Co.	408
Acme Industrial Co.	306
Acme Tool Co.	346
Acme Wire & Iron Wks.	431
Acromark Co.	355
Aget-Detroit Co.	384
Airway Pump & Equipment Co.	256
Alina Corp.	335
Allegheny Ludlum Steel Corp.	26, 27
Allen Industries, Alva	314
Allen Mfg. Co.	289
Allied Products Corp.	251
Aloris Tool Co., Inc.	373
American Machine & Foundry Co.	265
American Non-Gran Bronze Co.	424
American Tool Wks. Co.	261
Ames Co., B. C.	271
Anderson Bros. Mfg. Co.	355
Anton Machine Wks.	65
Apex Machine & Tool Co.	28
Apex Tool & Cutter Co.	377
Armstrong-Blum Mfg. Co.	22
Armstrong Bros. Tool Co.	114
Arrow Tool & Reamer Co.	312
Arter Grinding Machine Co.	106
Atkins Saw Div.	164
Atlantic Gear Wks.	382
Atlas Press Co.	56, 57
Atrax Co.	299
Auto Moulding & Mfg. Co.	330
Avey Drilling Machine Co.	195

— B —

Babcock & Wilcox Co.	247
Baldor Electric Co.	351
Barber-Colman Co.	178, 179
Barker Engr. Co.	431
Barnes Co., Inc., W. O.	340
Barnes Drill Co.	197

Bartelt Engr. Co.	349
Bathey Mfg. Co.	388
Behr-Manning, Div. of Norton Co.	298
Bellows Co.	72
Benchmaster Mfg. Co.	46
Besly-Welles Corp.	15
Black Diamond Saw & Machine Wks., Inc.	363
Blake Co., Edward	337
Bliss Co., E. W.	253
Boggis & Co., H. P.	347
Boyar-Schultz Corp.	96
Boye & Emmes Machine Tool Co.	209
Branch Mfg. Co.	360
Bremil Mfg. Co.	360
Brewster-Squires Co.	357
Bridgeport Surface Grinding Machine Co.	389
Brighton Screw & Mfg. Co.	269
Brown Corp., W. R.	307
Brown & Sharpe Mfg. Co.	14
Bryant Chucking Grinder Co.	18
Buck Tool Co.	417
Buckeye Tools Corp.	341
Bullard Co.	53
Bunting Brass & Bronze Co.	303
Busch Co., J. C.	390
Butterfield Div.	73

— C —

Caldwell Co., Inc.	349
Carborundum Co.	96b, 96c
Card Mfg. Co., S. W.	259
Carlton Machine Tool Co.	66, 67
Carroll Dividing Head Co.	308
Carroll & Jamieson Machine Tool Co.	270
Carter Products Co., Inc.	350
Cedar-West Tool Co., Inc.	242
Cerro de Pasco Corp.	316
Challenge Mchry. Co.	305
Chicago-Latrobe Twist Drill Wks.	207
Chicago Mfg. & Dist. Co.	357
Chicago Pneumatic Tool Co.	38



ILLUSTRATED
IS A WESTERN
No. 3-12 UPRIGHT
DRILL EQUIPPED
WITH A GUSHER
COOLANT PUMP.
MODEL 3-P3.

You'll Get

BETTER RESULTS

From
Your

**RUTHMAN
GUSHER
COOLANT PUMP**

because
RUTHMAN makes
a better pump

Don't take our word for it. We'll be glad to show you our long list of satisfied users, machine tool manufacturers that have used Gusher Coolant Pumps as standard equipment on their machines for *ten, twenty, thirty years*. Honestly, it reads like a blue book of the leading machine tool manufacturers. *Follow the leaders.* Specify Ruthman Gusher Coolant Pumps for all your metal cutting machinery.



THE RUTHMAN MACHINERY CO.

1817 READING ROAD

CINCINNATI 2, OHIO

index to advertisements

(For listing of products offered by these advertisers consult Where To Get It section)

Cincinnati Bickford Tool Co.	151
Cincinnati Electrical Tool Co.	436
Cincinnati Gilbert Machine Tool Co.	95, 408
Cincinnati Lathe & Tool Co.	104, 105
Cincinnati Milling Machine Co.	8, 9
Cincinnati Milling Machine Co., Cincinnati Milling Products Div.	163, 173
Cincinnati Shaper Co.	108, 109
Cincinnati Sub-Zero Products Co.	297
Cincinnati Tool Co.	396
Clark Co., Robt. H.	382
Clemson Bros., Inc.	252
Clipper Diamond Tool Co., Inc.	399
Collis Co.	300
Colonial Broach Co.	39
Comet Tool Co.	234
Commander Mfg. Co.	381
Commercial Centerless Grinding Co.	361
Comtor Co.	77
Conant Broach Co.	386
Connors & Davis Sales Corp.	345
Consolidated Machine Tool Corp.	79
Cook & Chick Co.	349
Cook, Inc., L. H.	300
Cooley Electric Mfg. Corp.	208
Covel Mfg. Co.	41, 78
Criterion Machine Wks.	275
Cross Co.	227
Cross & Son, Herbert	359
Crucible Steel Co. of America	68, 69
Cunningham Co., M. E.	384

— D —

Dake Engine Co.	229
Dakon Tool & Machine Co., Inc.	361
Dandy Burner Products	352
Danly Machine Specialties, Inc.	44
Davis Boring Tool Div., Giddings & Lewis Mch. Tool Co.	75
Davis Keyseater Co.	348
Dearborn Gage Co.	169
Defiance Machine & Tool Co.	276
Detroit Harvester Co., Pioneer Pump Div.	278
Detroit Reamer & Tool Co.	220
Detroit Stamping Co.	376, 410
Detroit Tap & Tool Co.	236
DeVlieg Machine Co.	191
Diamond Tool Co.	391
Donovan Mfg. Co.	369
Dreis & Krump Mfg. Co.	196
duMont Corp.	216
Dumore Co.	54, 55
Dykeim Co.	194

— E —

Eastern Centerless Grinding Co.	424
Eclipse Counterbore Co.	98
Economy Tool & Machine Co.	190
Edroy Products Co.	393
Eisler Engr. Co., Inc.	360

Electro-Mechano Co.	380
Elox Corp. of Michigan	157
Empire Tool Co.	62
Enco Mfg. Co.	395
Erickson Tool Co.	421
Etco Tool Co., Inc.	339
Ex-Cell-O Corp.	235

— F —

Fairfield Gauge Co., Inc.	357
Falls Products, Inc.	244
Farrel-Birmingham Co., Inc.	5
Federal Products Corp.	35
Federal Press Co.	334
Fellows Gear Shaper Co.	12, 13
Field & Son, Inc., Walter W.	206
Flynn Mfg. Co.	367
Foote-Burt Co.	71
Fosdick Machine Tool Co.	100, 101
Franklin Balmar Corp., N. A. Strand Div.	211
Fulfllo Specialties Co., Inc.	333

— G —

Galland-Henning Mfg. Co.	287
Gammoms-Hoaglund Co.	260
Gatco Rotary Bushing Co.	384
Gillen Co., John	353
Gisholt Machine Co.	7, 83
Gorton Machine Co., George	283
Grant Mfg. & Machine Co.	314
Greenlee Bros. & Co.	84

— H —

Hamilton Tool Co.	181, 183, 185
Hammond Mchry. Builders, Inc.	3
Hanchett Mfg. Co.	160
Hancock Mfg. Co.	29
Hannifin Corp.	374
Harig Mfg. Co.	43
Hartford Special Mchry. Co.	267
Hartford Steel Ball Co.	212
Hassall, Inc., John	50
Heald Machine Co.	Second Cover
Heimann Mfg. Co.	308
Heinrich Tools Inc.	318
Heller Bros. Co.	33
Herman Stone Co.	243
Heuser Mfg. Co.	400
Hi-Duty Drill Wks.	394
Himoff Machine Co., Inc.	326
Hisey-Wolf Machine Co.	433
Hjorth Lathe & Tool Co.	310
Holo-Krome Screw Corp.	Fourth Cover
Howell Machine Wks., W. T.	353
Howell Electric Motors Co.	237
Huot Mfg. Co.	274
Huppert Co., K. H.	347
Hy-Pro Tool Co.	217

— I —

Ideal Tool Co.	238
----------------	-----

A BARKER BENCH TYPE MILL

\$295.00

Complete with
1/2 H.P. motor

You can hold close tolerances.

Hundreds in use from coast to coast.

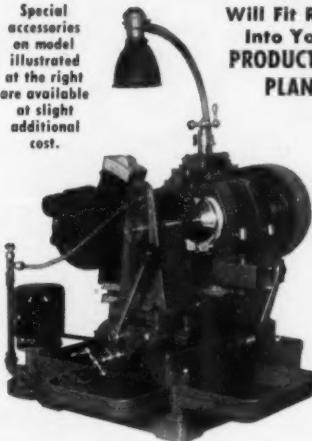
If you have small parts milling jobs the Barker Mill will do them.

General specifications: Table 4" x 12" with 5" travel. Spindle mounted on pre-loaded ball bearings. Speeds from 214 to 6000 R.P.M. Weight 160 lbs.

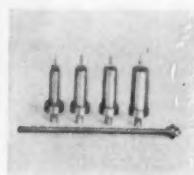
You'll Want the Complete Story on this Remarkable Mill. WRITE

Special accessories on model illustrated at the right are available at slight additional cost.

Will Fit Right
Into Your
PRODUCTION
PLANS



Straddle milling using our standard stub arbor.



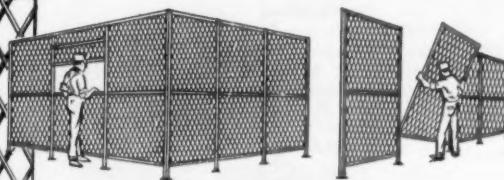
Stub arbors with pull back rod.

A Barker equipped with coolant pan, motor driven pump, arbor support, spindle coolant shield, cutter guard and 3 1/4" vise.

BARKER ENGINEERING COMPANY

502 GREEN RD., CLEVELAND 21, OHIO

Secure Positive Protection



**Standard Sections
Woven Wire Mesh Panels
& Doors to enclose Tool Cribs,
Stock rooms and other enclosures**

with **Acme**

**WIRE MESH
PARTITIONS
and
TOOL CRIBS**

Catalog
available



Immediate Delivery

Acme

WIRE & IRON WORKS

3527 Canfield Ave.—Detroit 7, Mich.

index to advertisements

(For listing of products offered by these advertisers consult *Where To Get It* section)

Industrial Filtration Co. 47
Industrial Metal Products Corp. 245

— J —

J & S Tool Co., Inc. 32b
Jacobs Mfg. Co. 107
Johnson & Bassett, Inc. 88
Johnson Bronze Co. 159
Johnson Gas Appliance Co. 210
Johnson Mfg. Corp. 291
Jones & Lamson Machine Co. 167

— K —

Kalamazoo Tank & Silo Co. 413
Kaufman Mfg. Co. 365
Kearney & Trecker Corp.,
Walker-Turner Div. 82
Kennametal, Inc. 317
Kent Machine Co. 352
Kidde Precision Tool Corp. 366, 367
Kling Bros. Engr. Wks. 319
Knight Mchry. Co., W. B. 11

— L —

L & J Press Corp. 324
L-W Chuck Co. 398
Lamina Dies & Tools, Inc. 281
Landis Machine Co. 2
Lassy Tool Co. 348
Lavallee & Ide, Inc. 221
LeBlond Machine Tool Co., R. K. 16, 17
Leiman Bros., Inc. 358
Le Roi Co. 113
Levin & Son, Inc., Louis 328
Lewthwaite Machine Co., T. H. 359
Lincoln Electric Co. 198
Linley Bros. Co. 351
Lipe-Rollway Corp. 321
Littleford Bros., Inc. 338
Lodge & Shipley Co. Third Cover
Logan Engr. Co. 301
Logansport Machine Co. 177
Lucifer Furnaces, Inc. 286
Luers, J. Milton 264
Lund Mfg. Co. 342

— M —

Madison-Kipp Corp. 354
Master Mfg. Co. 87
Master-Taper Co. 356
Masters 424
Mattison Machine Wks. 165
McCrosky Tool Corp. 32a
McDonough Mfg. Co. 313
Melin Tool Co., Inc. 6
Metallizing Engr. Co., Inc. 265
Michigan Chrome & Chemical Co. 367
Michigan Drill Head Co. 257
Millers Falls Co. 263

Modern Machine Tool Co. 343
Moore Special Tool Co., Inc. 329
Morris Machine Tool Co. 24
Morrison Co., D. C. 362
Morton Machine Wks. 368
Moth & Merryweather Mchry. Co. 175
Mummert-Dixon Co. 373

— N —

National Tool Co. 64
National Twist Drill & Tool Co. 145
Nebel Machine Tool Co. 76
Newcomer Products, Inc. 266
Niagara Machine & Tool Wks. 80, 81
Nicholson & Co., W. H. 201
Nielsen Tool & Die Co. 394
Nilson Machine Co., A. H. 249
Noble & Westbrook Mfg. Co. 32
Norgren Co., Inc., C. A. 149
Norma-Hoffmann Bearings Corp. 25
Norton Co. 89, 97, 218, 219
Numberall Stamp & Tool Co. 399
Nu-Tangs, Inc. 398

— O —

O. K. Tool Co. 239, 367
Oliver Instrument Co. 86
Oliver Mchry. Co. 373
Olson Industrial Products Co. 371
O'Neil-Irwin Mfg. Co. 155
Ottemiller Co., Wm. H. 361

— P —

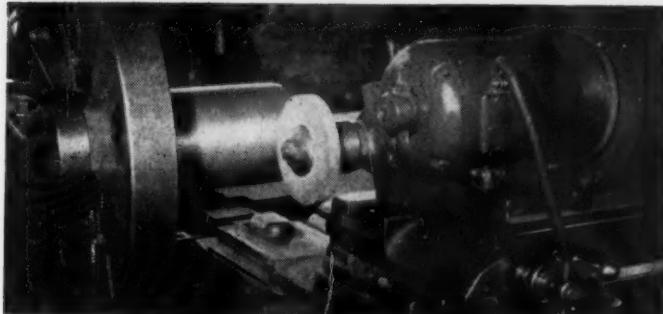
Pedrick Tool & Machine Co. 91
Perkin-Elmer Corp. 371
Pines Engr. Co., Inc. 94
Pioneer Pump Div., Detroit Harvester Co. 278
Pope Mchry. Corp. 193
Portage Double-Quick Tool Co. 325
Porter-Cable Machine Co. 213
Pratt & Whitney 19, 63
Precise Products Co. 240
Precision Tool & Mfg. Co. of Ill. 45
Precision Welder & Flexopress Corp. 407
Prochner Safety Chuck Co. 411
Production Specialties, Inc. 400
Prosser & Son, Thomas 412

— Q —

Quality Tool Wks. 410
Queen City Machine Tool Co. 383

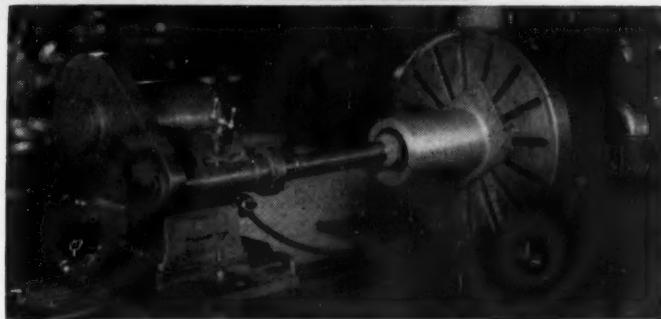
— R —

Racine Hydraulics & Mchry., Inc. 93
Radcop Corp. 403
Rahn Granite Surface Plate Co. 363
Raymac Mfg. Co. 398
Reading Machine Co. 347
Ready Tool Co. 304
Reed Rolled Thread Die Co. 250



EXTERNAL
(Wheel Guard removed for clarity)

INTERNAL ▶



Your Lathe Will Do Precision Grinding!



We also manufacture Bench and Pedestal Grinders and Buffers, Drill Grinders and Disc Grinders.

Ordinary lathes are easily converted with HISEY Precision Grinders.

Pulley selection gives correct speed for any size or type grinding wheel. External or internal grinding available—for internal wheels as small as $\frac{5}{8}$ " diameter—external up to 24". Regardless of load, constant speed motor insures uniform, efficient grinding.

Illustrated at left is the grinder with external spindle mounted, and two of the many internal spindles available. Grinder can also be mounted on shapers, boring mills, and planers for surface grinding operations.

Hisey THE HISEY-WOLF MACHINE CO.
CINCINNATI 8, OHIO
Division of The Cincinnati Electrical Tool Co.

Write today for catalog 72 MO

index to advertisements

(For listing of products offered by these advertisers consult *Where To Get It* section)

Reid Bros., Inc.	51
Reid Tool Supply Co.	356
Richards Co., J. A.	248
Rimat Tool Co.	355
Ring Punch & Die Co.	327
Riverside Foundry	403
Rivett Lathe & Grinder, Inc.	171, 371
Roberts Rubber Co., Weldon	40
Rock Island Millwork Co.	336
Rockford Clutch Div.	290
Rockford Machine Tool Co.	90
Rowbottom Machine Co.	363
Rusnak Tool Wks.	99
Ruthman Mchry. Co.	429

— T —

Taft-Pelrice Mfg. Co.	10, 102, 103
Tamms Industries, Inc.	388
Tanneowitz Works	225
Teeter, C. B.	342
Thermo Electric Mfg. Co.	365
Thompson & Son Co., H. G.	214
Thor Power Tool Co.	187
Thriftmaster Products Corp.	364
Tomkins-Johnson Co.	241
Torit Mfg. Co.	52
Torrington Mfg. Co.	36
Twentieth Century Mfg. Co.	296

— S —

Sales Service Machine Tool Co.	31
Sanford Mfg. Corp.	39
Savage Co., W. J.	390
Scherr Co., Inc., George	326, 353, 369, 386
Schmidt, Inc., Geo. T.	326
Schrader's Son, A.	215
Scott Paper Co.	20, 21
Scully-Jones & Co.	60, 61
Seibert & Sons, Inc.	70
Seneca Falls Machine Co.	23
Sentry Co.	59
Service Machine Co.	372
Services Directory	424
Sheldon Machine Co., Inc.	296
Sibley Machine & Foundry Co.	277
Sidney Machine Tool Co.	233
Skil Corp.	37
Skinner Chuck Co.	387
Smith & Sons, Geo. W.	385
Smith Tool & Engr. Co.	394
Somerset Tool Co.	348
Sonnet Tool & Mfg. Co.	58
South Bend Lathe Wks.	161
Speedgrip Chuck	262
Sberman Metal Specialties	246
Springfield Machine Tool Co.	48, 49
Stackblin Corp.	344
Standard Electrical Tool Co.	153
Standard Gage Co., Inc.	189
Standard Machine & Tool Co., Ltd.	375
Standard Oil Co. (Indiana)	199
Standard Pressed Steel Co.	110, 111
Standard Steel Specialty Co.	369
Standard Tool Co.	85
Staples Tool Co.	280
Starrett Co., The L. S.	309
Sterling Factory Equipment Co.	366
Strand Div., N. A., Franklin Balmar Corp.	211
Sturdimate Tool Co.	401
Sun Oil Co.	143
Sundstrand Machine Tool Co.	288
Sundstrand Magnetic Products Co.	42
Supreme Products, Inc.	34
Sutton Mfg. Corp.	402

— U —

Union Twist Drill Co.	231
Unit Mfg. Co.	397
U. S. Burke Machine Tool Div.	315
U. S. Drill Head Co.	284
U. S. Steel Supply Div.,	
U. S. Steel Corp.	273, 423
Universal Engr. Co.	332

— V —

Van Keuren Co.	74
Verson Allsteel Press Co., Inc.	92
Vine, Inc., R. A.	424
Vlier Engr., Inc.	285
Vulcan Tool Co.	323
Wade Instrument Co.	347
Walker-Turner Div., Kearney & Trecker Corp.	82

— W —

Walls Sales Corp.	365
Walton Co.	359
Waltham Machine Wks., Inc.	330
Wardwell Mfg. Co.	370
Watts Bros. Tool Wks.	310
Webber Gage Co.	419
Weldon Tool Co.	282
Wells Mfg. Corp.	392
Whistler & Sons, Inc., S. B.	4
White Dental Mfg. Co., S. S.	378
Whitehead Stamping Co.	302
Whitney Mfg. Co., W. A.	310
Whitton Mfg. Co.	320
Willey's Carbide Tool Co.	322
Wilson Mechanical Instrument Div.	First Cover
Winter Bros. Co.	144
Wirth & Son, Inc., Carl	158
Wisconsin Drill Head Co.	331
Wittek Mfg. Co.	96d

— Y —

Yoder Co.	96a
-----------	-----

— Z —

Zagar Tool, Inc.	279
Zeh & Hahnemann Co.	351

**“...through a
person-to-person
canvass...”**

ROBERT S. MACFARLANE

*President
Northern Pacific Railway Company*



“Combine a good product with enthusiastic salesmanship, capably directed, and favorable results are reasonably certain. This winning combination through a person-to-person canvass recently added more than 8,000 employees of the Northern Pacific Railway to the Payroll Savings Plan for purchase of U. S. Savings Bonds. It is gratifying to me that the organized efforts of Northern Pacific personnel not only have resulted in substantially increased systematic saving and a greater investment in America's future by our employees, but that the Treasury Department is using our campaign as an example throughout the railroad industry in its efforts to step up regular purchases through payroll deductions.”

The U. S. Savings Bond is a good product . . . Payroll Savers are enthusiastic Bond Salesmen . . . company spirit was good because everybody on the Road knew that Mr. Macfarlane was 100% behind the effort to increase employee participation in Northern Pacific's Payroll Savings Plan.

But, there was still another, and very important, factor in the success of Northern Pacific's campaign that added more than 8,000 new Payroll Savers — a Person-to-Person Canvass, an organized employee effort that puts a Payroll Savings Application Blank in the hands

of every employee. Every man is free to make his own decision. Most employees want to build personal security and are quick to join the Payroll Savings Plan when its availability and advantages are brought to their personal attention.

If your company has the Payroll Savings Plan your State Director will be glad to help you organize a Person-to-Person Canvass to increase employee participation. If you do not have a Plan he will show you how easy it is to install one. Write to Savings Bond Division, U. S. Treasury, Washington, D. C.

The United States Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

MODERN MACHINE SHOP



AIR MASTER Says to Harmful Grit!

Grit is the enemy of costly machines, and of manpower, too. Put a stop to this menace with the AIR MASTER.

Trapped as they leave the wheel of your grinder or buffer, flying particles are filtered out by fabric and steel wool bags. Only grit-free air is discharged. AIR MASTER is self-contained, ruggedly built for long years of trouble-free service.



There's an AIR MASTER model for every grinder and buffer. Give your plant this protection NOW!

Write today! Ask for name of your distributor or Bulletin 54-BA.

THE BEST IN
DRILLS, GRINDERS, BUFFERS,
PORTABLE TOOLS

TRADE *The Cincinnati* MARK

THE CINCINNATI ELECTRICAL TOOL CO.

Division of THE R. K. LeBLOND MACHINE TOOL CO.

2692 MADISON ROAD • CINCINNATI 8, OHIO

here's a "hole" lot of versatility . . .

Lodge & Shipley OIL COUNTRY LATHES

The Lodge & Shipley Oil Country or Hollow Spindle Lathe is like two lathes in one. Very long pieces . . . far longer than the normal center-to-center distance . . . can be chucked right through the large hole in the spindle. You save capital investment and floor space too! Add a headstock collet and center and you can do all normal between-center work.

The two-speed drilling tailstock makes drilling easy . . . you can feed even a 6-inch drill into solid steel stock. The leadscrew is reversible, end-for-end.

This unique Lodge & Shipley feature doubles leadscrew life.

If you want extreme versatility . . . you want the Lodge & Shipley Oil Country Lathe.

Write for detailed literature: The Lodge & Shipley Co.,
3055 Colerain Ave., Cincinnati 25, Ohio.

Lodge & Shipley
...your LODGE-ical choice!





AVAILABLE
THROUGH
HOLO-KROME
AUTHORIZED
INDUSTRIAL
DISTRIBUTORS

ALL
STANDARD
SIZES
in stock!

HOLO-KROME
Completely Cold Forged
SOCKET SCREWS

THE HOLO-KROME SCREW CO. • HARTFORD 10, CONN.